THE ECONOMICS OF ALCOHOL USE, MISUSE AND POLICY IN SOUTH AFRICA

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EXECUTIVE SUMMARY

1. INTRODUCTION

Ever since wine was first produced in the Cape Colony in the 17th century, alcohol has played an important role in South Africa's history, culture, politics and economy. South Africa has a large and powerful alcohol industry with global reach. The industry employs large numbers of people in the primary, secondary and tertiary sectors of the economy.

On the other hand, harmful alcohol use imposes major costs on society, primarily through injuries, alcohol-related diseases and a variety of social ills. Society needs to strike a balance between, on the one hand, the economic contribution of the industry and the health benefits associated with moderate drinking and, on the other hand, the costs of alcohol abuse. For both individuals and society there is an optimal point of consumption. Through legislation (e.g. outlawing drunk driving) and regulation (e.g. of liquor outlets' trading hours) the government aims to move society closer to this optimal position. This is a difficult balance and must take into account political, economic and social realities. Society and even the alcohol industry support the principle that government may impose restrictions on the harmful use of alcohol. The disagreement is typically about where to draw the line.

In order to reduce harmful alcohol use and to reduce the associated harms on society the Minister of Health has recently tabled legislation that aims to ban alcohol advertising. The Minister is facing fierce opposition from the alcohol and advertising industries, and even from some other ministries within the government. The arguments used by the alcohol industry and its allies against the proposed advertising ban are very similar to the arguments made by the tobacco industry in the late 1990s when a ban on tobacco advertising was being debated. There are significant overlaps between tobacco control policy and alcohol control policy, and the proposed ban on alcohol advertising follows the precedent of the legislation that banned tobacco advertising, promotion and sponsorship in 2001.

This report is largely based on the experience that large excise tax increases on cigarettes and other tobacco products have caused a large decrease in tobacco use in South Africa over the past 20 years. By raising the real (i.e. inflation-adjusted) excise tax nearly six-fold since 1993, the government reduced aggregate cigarette consumption by more than a third, per capita consumption by more than half, and reduced smoking prevalence from 33% in 1993 to approximately 20% at present.

While tobacco taxation is a good model for alcohol taxation, alcohol is a far more complex issue than tobacco. Traditionally three alcohol categories are identified (i.e. beer, wine and spirits), and within these categories are a multitude of sub-categories. An increase in the price of one product allows consumers to substitute to a plethora of alternatives, or may encourage them to brew their own alcohol products. Some of these concoctions can be very dangerous. A further complication is that, from a medical perspective, the optimal consumption of alcohol is not zero. Moderate consumption has been shown to reduce the risk of contracting certain diseases. Tobacco taxation does not have this complication, because tobacco smoking is hazardous at all consumption levels.

This report focuses on the fiscal aspects related to alcohol policy in South Africa. In particular, the report considers trends in alcohol taxation, tax revenues, pricing, affordability, consumption and prevalence, and how these interact with each other. A particularly important relationship is that between alcohol prices and alcohol consumption, summarised in the price elasticity of demand. The threat of illicit alcohol production, especially in the context of an increase in the excise tax, has received much attention, and is also discussed in this report.

The report was commissioned by the World Health Organization South Africa country office in order to increase the evidence base and support the development of country-level policies to assist in the reduction of harms related to the harmful use of alcohol.

2. TRENDS IN ALCOHOL PREVALENCE

The All Media and Products Survey (AMPS) is a regular survey that considers the expenditure patterns of a nationally representative sample of between 15 000 and 31 000 respondents. Respondents are asked whether they consumed alcohol in the seven days prior to the survey,[1] and, based on their responses, are classified as non-users, light users, medium users or heavy users. These definitions are set by AMPS.

Alcoholic products reviewed here are separated into four broad categories: (1) beers, including regular and sorghum beers; (2) wines, including boxed, corked, fortified and sparkling wine; (3) spirits, including brandy, rum, whisky and white spirits (cane, gin and vodka); and (4) flavoured alcoholic beverages (FABs) and liqueurs. The drinking prevalence percentage is defined as the number of respondents who declare alcohol usage, expressed as a percentage of the population in that category.

We have consistent annual prevalence data between 2001 and 2012. In order to estimate current prevalence of use we calculated the average of the prevalence percentages for 2010-2012. This was done for total prevalence of use and "heavy prevalence" We also estimated the average annual growth in prevalence (again for the total and for heavy prevalence) using a constant growth rate regression line.

Of all alcohol categories beer has the highest prevalence amongst males (34%). This percentage has remained broadly constant over the past 12 years. Beer also has the highest "gender gap", with prevalence of use among males being about four times that of females.

Prevalence of spirits use amongst males is about twice that of females. For wine, the prevalence of use amongst males is only marginally higher than that amongst females. The only sub-category where female prevalence is higher than male prevalence is sparkling wine/champagne (8% vs. 7%).

In the past 12 years there has been a very rapid increase in the prevalence of flavoured alcoholic beverages amongst both males and females. Prevalence of use of FABs amongst females is currently 21%, only marginally lower than that of males at 23%.

Of the nine provinces, the Free State generally has the highest prevalence rate followed by Gauteng, the Northern Cape and the Western Cape. Kwazulu-Natal, the Eastern Cape and Limpopo generally have the lowest prevalence rates.

Of the various race groups, White males have the highest prevalence for beer (36%), brandy (20%), whisky (19%), natural table wine in corked bottles (15%) and sparkling wine (9%). In four of the five sub-categories, however, White male prevalence has been declining since 2001. At the same time the prevalence of use amongst African males prevalence has been increasing, narrowing the race gap.

Black males' prevalence of use of beer (34%) is the highest of the various categories, followed by FABs (25%), whisky (17%), brandy (17%), liqueur (12%), sorghum beer (9%) and white spirits (9%). Prevalence of use of FABs and liqueurs is increasing at a statistically significant rate, while prevalence of use of sorghum beer and white spirits is declining. This suggests a move towards higher value, "popular" drinks and away from traditional, lower value drinks. The move away from traditional, lower value drinks, even though the

[1] The only exception is sparkling wine/champagne, where the recall period was four weeks.

price of most beverages were increasing in real terms, suggests that the fear that an increase in the alcohol excise tax would result in a large increases in home brew alcohol and concoctions, is probably misplaced.

Generally prevalence of alcohol is highest amongst people who are in Living Standards Measures (LSMs) 5 and 6. People in LSMs 9 and 10 have a significant and declining trend in prevalence for beer, brandy, natural table wine (corked and boxed) across all ages.

Underage drinking prevalence (15-17 years) is currently 19% for FABs in LSMs 5 and 6 and heavy prevalence is 9% in LSM 6. Other alcohol categories where underage drinking is high include liqueur, beer and spirits.

3. TRENDS IN ALCOHOL EXCISE TAXES, EXCISE REVENUE AND CONSUMPTION IN SOUTH AFRICA

Excise taxes on beer and spirits have been levied for more than 100 years in South Africa. Wine has been taxed intermittently since the early 1940s and sorghum beer has been taxed since 1992. Excise taxes on alcohol are levied as a specific tax. Currently (2013/14) beer is taxed at R63.81 per litre of absolute alcohol, spirits at R122.80 per litre of absolute alcohol, wine at R2.70 per litre of wine (irrespective of the alcohol content) and sorghum beer at 7.82 cents per litre of sorghum beer (irrespective of the alcohol content).

The Treasury reports on excise tax revenues for four categories: (1) beer, (2) traditional beer and traditional beer powder (i.e. sorghum beer), (3) wine and other fermented beverages, and (4) spirits. Of these four categories, beer is the single most important source of alcohol excise tax revenue (59% of the total), followed by spirits (27%) and wine (14%). Revenues from sorghum beer are negligible. Although alcohol excise revenues have been increasing in real terms since 2000, as a percentage of total government revenue it has been decreasing and currently comprises about 1.4% of government revenue.

Between 1990 and 2013 the real excise tax on beer increased by 32% and on spirits by 87%. While these are sizable increases, they are modest in comparison to the 459% increase in the real excise tax on cigarettes over the same period. During the 1970s and 1980s inflation eroded the real value of the excise tax on alcohol and tobacco. Because the excise tax is levied as a specific tax, the government needs to adjust the amount regularly to avoid it being eroded by inflation. In the 1970s and the 1980s this did not happen. Despite the increases in the excise tax in the past 24 years, the real excise tax on beer is currently less than one third of its peak level in the 1960s and that of spirits about two thirds of its peak level in the 1970s. In contrast, the real excise tax on cigarettes is currently more than two thirds higher than what it was at its “peak” in the early 1970s.

There large differences in the excise tax per unit of absolute alcohol for different categories of alcohol, and these differences have increased over the past 20 years. Spirits are taxed the most heavily, as is the case in most countries. Expressed as a percentage of the tax on the absolute alcohol in spirits, absolute alcohol in beer is currently taxed at 52% (73.8% in 2000). For wine the tax on absolute alcohol is about 18.3% of that on spirits (18.7% in 2000) and for sorghum beer 2.1% (8.2% in 2000).

By dividing the excise tax revenue of beer, sorghum beer and spirits by the appropriate excise tax amount, one can derive the tax-paid quantities for each financial year.[2] For example, in the 2012 financial year the

[2] This could not be done for wine, because the Treasury reports the revenue for “wine and other fermented beverages”. The rapid growth in the market for flavoured alcoholic beverages and similar drinks, and the fact that wine was not subject to any excise tax in some years, meant that is was impossible to obtain the quantity of wine consumed from the Treasury’s published data.

excise revenues imply that nearly 2800 million litres of beer (with 5% alcohol content equivalent) were consumed in South Africa, which translates to a per capita consumption (for people aged 15 and older) of 78 litres of beer per year. According to AMPS data only about 21% of South African adults consume beer, implying that the average adult beer drinker consumes 370 litres of beer per year.

After increasing very rapidly between 1960 and 1990, since 1990 aggregate beer consumption increased at a rate of 0.7% per year, while per capita consumption decreased by 0.9% per year. Sales of spirits grew very rapidly before 1970, but have remained broadly the same since the early 1970s. Per capita spirits consumption of decreased at an average annual rate of 2.3% for the past 40 years. Despite the fact that sorghum beer is subject to a very low and, in real terms, decreasing, excise tax, the quantity of commercially produced sorghum beer sold has decreased at more than 5% per year between 1992 and 2012.

4. TRENDS IN ALCOHOL PRICES

In order to calculate the Consumer Price Index, Statistics South Africa collects price data on a monthly basis. We obtained very detailed price data (more than 200 000 records) for the period December 2001 to May 2013 (but with an unfortunate 24-month gap in 2006 and 2007), and used these to graphically present trends in the real (i.e. inflation-adjusted) prices for lager, dark beer, red wine, white wine, brandy, liqueur and whisky. We also graphically present price trends in some of the major brands in each of the various sub-categories.

The average real price of alcohol has generally increased over the past 12 years. For most alcohol sub-categories the real price has increased by between 20% and 40% over this period, which corresponds to average annual increases of 1.6% and 3.0% respectively. While most individual brands have also experienced an increase in the real price, some brands, and in particular the red wine brands, have experienced decreases in the real retail price. The price increases in most sub-categories and brands have been fairly consistent, i.e. not subject to major fluctuations. The only notable exceptions are the three most monitored white wine brands. They have experienced sizable volatility in the price, even over short periods.

When the government increases the excise tax, the increase is often passed on to consumers in the form of higher prices nearly immediately. For some products and some time periods, the absolute increase in the retail price is greater than the absolute increase in the excise tax. The fact that excise tax increases are passed onto consumers in the form of higher prices makes an increase in the excise tax a potent tool to reduce alcohol consumption, but only if it is clear that an increase in the retail price of alcohol actually reduces alcohol consumption. International and South African evidence clearly indicate that this is the case.

Since 2002 the Treasury has set targets for the total tax burden for the three alcohol categories. The total tax burden is defined as the sum of the excise tax and VAT amount, expressed as a percentage of the average retail price of that alcohol category. The original tax burden target for beer was 33%, and was increased to 35% in 2012. For wine the target was initially set at 23%, and it has remained 23% ever since. For spirits the target was set at 43% in 2002, and increased to 48% in 2012. Based on current excise taxes, the average retail price for beer (5% alcohol content) should be R4.78 per 340 ml can (or equivalent); the average retail price of wine should be R18.93 per 750 ml and the average retail price of spirits (43% alcohol content) should be R110.93.

The fact that beer and wine prices, as reported by Statistics South Africa, are generally much higher than R4.78 per 340 ml can (or equivalent) and R18.93 per 750 ml bottle, respectively, suggests that the excise

taxes on these two categories are set too low. Should the Treasury find that the average retail price of beer and wine is in fact higher than the number on which the excise tax is based, this would imply that it should increase the excise tax on these categories.

Based on the price data provided by Statistics South Africa, it seems plausible that the excise tax on spirits is such that the total tax burden target of 48% is met.

Alcohol is sold in various units of volume (which we call packages). This is true for all categories, but especially for beer. Using the prices of one brand (to avoid biases as a result of adding different brands together), we find that the price per litre of beer bought in "six packs" is currently 8% (for 6 x 330 ml), 13% (for 6 x 340 ml) and 18% (for 6 x 440 ml) cheaper than the price per litre of beer that is bought in individual 340 ml cans. The discount for the 6 x 440 ml pack has increased from 12% in 2009-2010 to 18% currently. The price discount for individual 750 ml bottles has increased from 25% in 2009-2010 to 33% at present. For this brand at least, the consumption of larger quantities of beer is encouraged through the pricing mechanism.

5. NEGATIVE EXTERNALITIES ASSOCIATED WITH ALCOHOL

According to the World Health Organisation South Africa has one of the highest levels of alcohol consumption in the world, with 16.6 litres of absolute alcohol consumed per drinker per year. South Africa's "pattern of drinking" (a measure which takes account of how the alcohol is consumed, e.g. with the intention of getting drunk, in excess, outside of meal times, daily, etc.) is similar to those of countries notorious for their heavy drinking, such as Kazakhstan, Mexico, the Russian Federation and the Ukraine. This indicates that there is greater harm per litre of alcohol consumed in South Africa than in other regions where drinking prevalence may be more widespread but where harmful use is rare. As a consequence, South Africa experiences alcohol-related costs and externalities above global averages, especially in the area of acute conditions.

The negative externalities linked to alcohol use include health and crime expenditure by government, labour and productivity costs and non-financial welfare costs. We note the most pertinent externalities for each category in South Africa using secondary data sources that have recorded alcohol-attributable fractions (AAFs), disability-adjusted life years (DALYs) or financial costs. AAFs are calculated as the percentage of offenders who tested positive for alcohol consumption.

Alcohol is involved in a variety of crimes, misdemeanours and accidents. For example, alcohol is involved in more than 50% of interpersonal violence cases. Similarly, for transport fatalities, alcohol is associated with 53% of all cases, ranging from 40% of cyclist deaths to 60% of pedestrian deaths. Alcohol is involved in 60% of all burn cases, in 40% of drownings and in 35% of suicides.

Of the chronic conditions associated with alcohol use, the largest number of DALYs lost are due to alcohol dependence (about 120 000 DALYs per year), followed by cirrhosis of the liver (74 000 DALYs), epilepsy (52 000 DALYs) and hypertensive disease (32 000 DALYs). Infectious diseases whose effects are worsened by alcohol use are TB (with 183 000 DALYs in 2010) and HIV/AIDS (with 173 000 DALYs in 2010).

Although the negative health implications of harmful alcohol use are severe, some benefits of moderate alcohol consumption can be seen for diabetes, stroke and ischaemic heart disease.

The negative externalities associated with the harmful use of alcohol have substantial cost implications for the government. A study by Debbie Budlender in 2010 shows that in 2009/2010 the National and Provincial

Departments of Health incurred direct costs related to harmful alcohol use of R6.8 billion. The Department of Safety and Security followed with costs of R5.8 billion. The Department of Correctional Services bore the third-largest cost, at R3.4 billion.

The second major category of alcohol-related negative externalities includes labour and productivity costs. These costs are typically difficult to quantify. These costs include, but are not limited to, absenteeism, job turnover due to premature death, inappropriate behaviour e.g. theft and crime, and alcohol-related morbidity e.g. foetal alcohol syndrome.

The third major category is non-financial, intangible welfare costs. These costs are often incurred by those who do not abuse alcohol, but because of the actions of those who do. They include noise pollution, pain and suffering due to the death or injury of a loved one from an alcohol-attributed crime or accident, being the victim of alcohol-induced crime etc. Other social welfare costs include the cost of alcohol tax evasion, alcohol-attributable litter, vandalism and fires.

When externalities vary across units consumed but a uniform tax is imposed to avoid costly or unfeasible processes, the outcome can be improved by supplementing the tax with direct regulation on consumption. In order to address the negative externalities of alcohol, certain policies are recommended for South Africa. These include increases in the excise tax, increase in the number of sobriety check-points, administrative license suspensions and graduated licensing for novice drivers. Other strategies that have been recommended for South Africa include workplace interventions, broad-based community initiatives and specific interventions aimed at drunk pedestrians, drunk drivers and pregnant women. These policy interventions should be coupled with stronger enforcement of existing legislation and regulation of the market.

6. AN INTERNATIONAL ANALYSIS OF ALCOHOL AFFORDABILITY

While a product's price is an important determinant of the demand for that product, the other crucial determinant is the consumer's income. Affordability combines both these determinants into a single concept. A product can become more affordable if the price decreases, or income increases, or if the price increases by a smaller percentage than the increase in income.

A number of affordability measures exist and these have been used to calculate the affordability of four beverages (beer, wine, gin and whisky) in a large number of countries. The relative income price (RIP) is defined as the percentage of per capita GDP required to buy a certain volume (e.g. 100 cans of beer or one 750 ml bottle of whisky) of the beverage in question. The minutes of labour approach considers how long a worker earning the median wage of 12 or 13 standard occupations has to work in order to buy certain volume of the beverage.

Affordability measures are best used in a comparative context, either to compare the level of affordability of a product in one country relative to that in other countries at one point in time, or to monitor changes in affordability in a country over time.

Expressed in a common currency using market exchange rates, the price of beer is lower in low- and middle-income countries than in high-income countries, but wine, gin and whisky are priced similarly. The price of beer in South Africa is close to the median of low- and middle-income countries; wine, gin and whisky is much cheaper in South Africa than in the median low- and middle-income country. In fact, the price of spirits in South Africa is among the lowest in the world.

Because the average levels of income are so much higher in high-income countries, alcohol products are much more affordable in high-income countries than in low- and middle-income countries. Based on the RIP measure, in 2012 beer was about five times more affordable in the median high-income country than in the median low- and middle-income country. Wine was ten times more affordable in high income countries, gin seven times more affordable and whisky 17 times more affordable. For the minutes of labour approach, the differences in affordability between these two groups of countries were less pronounced, but still substantial.

Average annual percentage changes in the real price and the affordability measure were calculated for the 1990-2012 period for each of the four products. In more than two thirds of countries (both high-income countries and low- and middle-income countries) the real price of alcohol decreased over this 23-year period. In contrast, in South Africa the real price of these four products increased by a modest percentage.

Based on the RIP affordability measure, alcohol became more affordable in nearly all countries. This is unsurprising, because most countries experienced a decrease in the real price of alcohol. This, together with robust economic growth, made alcohol more affordable. Based on the minutes of labour approach, these four products became more affordable in two thirds to four fifths of countries, depending on the product. All four products have also become more affordable in South Africa.

Using a longer dataset, we investigated trends in the affordability of beer and brandy in South Africa since 1970. Both these products have become more than 60% more affordable over that long time period.

While alcohol has become more affordable over the past two decades, cigarettes have become significantly less affordable. The experience with cigarettes is important, given the many overlaps between alcohol and tobacco policy. The decrease in the affordability of cigarettes was the result of a deliberate policy of increasing the excise tax in order to reduce smoking in the country. The strategy has been very successful. This experience with tobacco builds the case to use increasing excise taxes as a policy tool to reduce the affordability of alcohol products over time in South Africa.

7. LITERATURE REVIEW ON THE PRICE AND INCOME ELASTICITIES OF ALCOHOL

The sensitivity of consumption to changes in the price is quantified by means of the price elasticity of demand. The price elasticity (and the income and cross-price elasticities, which measures the responsiveness of consumption to changes in income, and changes in the prices of related goods, respectively) can be estimated using time-series, cross-sectional or longitudinal data. In the latter case the same individuals or households are surveyed in consecutive waves of the survey.

In the past two decades analyses based on time series data have become less common and there has been a stronger focus on cross-sectional and longitudinal (or panel) studies.

The different types of data require different estimation techniques, and each has their advantages and drawbacks. Because the cross-sectional data are usually more multi-faceted, one can ask more interesting questions than with time series data. Many studies consider the demand for the various alcohol categories (typically beer, wine and spirits). In such cases the demand for alcohol is best estimated using a systems approach. The Almost Ideal Demand System, initially presented by Angus Deaton and John Muellbauer in 1980 and subsequently generalised by other researchers, is still the primary theoretical framework for estimating price, income and cross-price elasticities.

A large empirical literature considers the relationship between alcohol consumption and alcohol prices. For the current study we found approximately 80 studies that estimated the price elasticity of demand for alcohol. Most of these studies were performed in high-income countries, but a growing literature also considers the demand for alcohol in low- and middle-income countries. The literature finds that an increase in alcohol prices reduces alcohol consumption. The price elasticity of demand varies between countries, but is nearly always in the inelastic range (i.e. between -1 and zero), for high-, middle- and low-income countries. For low- and middle-income countries most price elasticity estimates lie between -0.4 and -0.8, which implies that a 10% increase in the price of alcohol reduces alcohol consumption by between 4% and 8%.

The empirical literature clearly indicates that the income elasticity of demand for alcohol is positive, indicating that an increase in income would increase alcohol consumption. For low- and middle-income countries the income elasticity for alcohol averages around 1.2, with a range of between 0.8 and 1.6 for most countries. A 10% increase in average incomes would thus increase alcohol consumption by between 8% and 12%. Studies that have considered income elasticities for different alcohol categories find that spirits are more income elastic than wine and especially beer. Thus, spirits would be classified as a "luxury" while wine and beer would be classified as "necessities".

By calculating cross-price elasticities one can determine whether different categories of alcohol are substitutes or complements of each other. Data limitations often prevent researchers from investigating these relationships, and even amongst the studies that have estimated cross-price elasticities, no consistent picture emerges. This prevents us from making any definitive conclusions about the nature of the relationship between alcohol categories.

We found two studies that estimated the demand for alcohol in South Africa.[3] In an influential study in 2002, the National Treasury estimated price and income elasticities for beer, wine and spirits separately, and, within these three categories, for even narrower definitions of alcohol. The estimated price elasticities were the following: normal beer: -0.40; light beer: -0.47; low-price wine: -1.08; medium-price wine: -0.84; high-price wine: -0.42 and spirits: -0.75. These price elasticity estimates are typical of low- and middle-income countries. A 2005 study by Selvenathan and Selvenathan estimated the price elasticity of "all alcohol" at -0.8, which is at the high end (in absolute terms) of the range of price elasticities for low- and middle-income countries.

The National Treasury also estimated the income elasticity of demand for the various alcohol categories, and found the following: normal beer: 0.43; light beer: 0.46; low-price wine: 0.77; medium-price wine: 1.00; and high-price wine: 0.71. No income estimates were presented for spirits. Selvenathan and Sevenathan estimated the income elasticity for "all alcohol" at 1.1, which is typical of low- and middle-income countries.

8. ESTIMATING THE PRICE ELASTICITY IN SOUTH AFRICA

If the government wishes to use an increase in the excise tax on alcohol to reduce harmful alcohol use, it needs to be quite sure that the proposed strategy will have the appropriate impact. In particular, it would want to know that an increase in the price of alcohol will reduce consumption, especially amongst the groups that are most at risk from suffering the ill effects of alcohol, i.e. specifically the poor and heavy drinkers.

[3] We also found a reference to a 2010 study by SALBA, but were unable to locate the actual study.

Using data from Waves 1 (2008) and 3 (2012) of the National Income Dynamics Study (NIDS), we estimate the price elasticity of the demand for alcohol for the population as a whole, and for sub-populations based on income and drinking patterns respectively.

Even though NIDS is a longitudinal data set, we do not exploit the panel aspects of the data, but regard them as two separate cross-sections. We use techniques developed by Angus Deaton to estimate the price and income elasticities of demand. The NIDS data asks detailed questions about households' spending patterns, amongst others about alcohol. Individuals are asked about how much alcohol they consume; these data are then used to determine the total alcohol consumption in the household. Households are not asked to report on the prices that they pay for the alcohol, or the type of alcohol that they consume. The latter point makes it impossible to estimate the price and income elasticities of individual alcohol categories, which is unfortunate but unavoidable.

The "price" or unit value is derived by dividing the household's total monthly expenditure on alcohol by the household's total monthly consumption of alcohol. The estimation technique controls for the fact that richer households are likely to purchase better quality alcohol and thus pay a higher price for it. The price and income elasticities are estimated after controlling for a host of household, socio-economic and geographical characteristics.

For the population as a whole, the price elasticity is estimated at -0.52 for Wave 1 and -0.56 for Wave 3, while the income elasticity is estimated at 0.22 for Wave 1 and 0.23 for Wave 3. The price elasticity falls in the low- and middle-income country range. The income elasticity is low in comparison with most other countries.

We divided the sample into two halves, based on income, and estimated price and income elasticities for the two sub-samples.[4] The poorer half of the population has a more price elastic demand than the richer half of the population. Thus the poor reduce their alcohol consumption by a greater percentage in response to an increase in the price of alcohol than the rich. To the extent that alcohol use among the poor is regarded as a problem, this is an important finding, because an increase in the price of alcohol will have a greater impact on the poor than on the more affluent.

We divided households into heavy drinking, moderately drinking and non-drinking households and estimated price and income elasticities for heavy and moderately drinking households. A household was defined as a heavy drinking household if at least one person in that household consumed an average of at least 1.5 drinks per day (i.e. 548 per year). We find that moderately drinking households are more price sensitive than heavy drinking households.

The implication of this finding is that an increase in the price of alcohol is not as effective at reducing alcohol consumption amongst heavy drinkers as amongst moderate drinkers. However, an increase in the price is not completely impotent. A 10% increase in the price reduces alcohol consumption amongst heavy drinking households by 2.8%. Furthermore, an increase in the price of alcohol is likely to reduce the number of current moderate drinkers from developing into heavy drinkers.

9. ILLICIT TRADE IN ALCOHOL

The definition of illicit alcohol is complex and includes two broad areas of concern: first, alcohol products that avoid and evade excise taxes, and second, the sale and consumption of products outside the control of

[4] We only report the results for wave 1 data here. The full results are in the main text.

the usual system of government regulation. Of greater concern to policy is tax avoidance and tax evasion, since this has the ability to undermine government's ability to use excise tax as a tool to reduce the harmful use of alcohol.

Tax evasion occurs when, for example, people smuggle products from other countries without paying the domestic excise tax, or buy counterfeit products on which no tax is paid or buy seemingly legitimate products on which tax is not paid. Other methods of tax evasion include the dilution of the excise tax, for example, when tax is paid on only a part of a manufacturer's production or a part of an importer's imports.

Products sold outside the control of the usual system of government regulation may include products on which tax is paid but sold in unlicensed venues or to minors. It also includes home brews or products which do not meet regulatory standards. Sometimes it may not be clear that tax is not paid since these products may not meet the definition of excisable products. For example, surrogate alcohol is not excisable because it is produced for industrial purposes. However, if surrogate alcohol is consumed this would be regarded as irregular and outside of the regulatory framework.

There are important lessons to be learnt from the illicit trade in cigarettes in South Africa. Even though taxes on cigarettes have increased sharply over a long time period the alleged growth in the illicit trade in cigarettes has not undermined tobacco control efforts. Tax revenues have grown broadly in line with expectations and smoking prevalence has decreased. The willingness of the tobacco industry to overstate the scale of the illicit trade in cigarettes has been established and is well documented.

Estimating the size of the illicit alcohol market is understandably highly contentious, as there has been little research conducted in South Africa that adequately and representatively samples the local population. Estimates are typically based on "expert opinion" that has yet to be tested by evidence-based research. The illegal and informal nature of the activity means that it is inherently difficult to observe and thus measure. Additionally, different actors have different incentives when estimating the size of the market. For instance, the alcohol industry may wish to overstate the level of illicit trade since they argue that taxes are the primary driver of illicit trade. Their remedy for illicit trade is therefore to lower taxes or not to increase taxes. A reduction in taxes could result in lower prices, and thus increase the size of the total market, or result in greater profit margins.

The estimates for South Africa vary in terms of the size of the illicit market as well as the definition used for the market. Estimates generated for the South African authorities (the Treasury and the Department of Trade and Industry) indicate a much smaller illicit market than a much-quoted study by the World Health Organisation. The WHO study indicates that illicit per capita alcohol consumption is 2.5 litres per year, or 26% of the total market. The other studies suggest that illicit consumption is only 1 litre per year, or 14% of the total market. All studies are in agreement that the major source of illicit alcohol use, in terms of absolute alcohol, is illicit home-brew, followed by spirits and then wine.

Illicit alcohol also raises health and safety concerns. It is argued that some illicit alcohol is significantly more dangerous than the well-regulated legal products, and the South African literature indicates that these concerns are valid. These concerns apply to much of the home brewed market but also to surrogate alcohol.

Finally, there is little evidence to suggest that an increase in the excise tax on alcohol products will significantly increase the illicit trade in alcohol products and even if there is, the experience from tobacco indicates that it is unlikely to undermine efforts to reduce the harmful use of alcohol.

10. ALCOHOL IN SOUTH AFRICA AND ITS NEIGHBOURING COUNTRIES

South Africa has six neighbouring countries, four of which make up the Southern African Customs Union (SACU), and two others, Mozambique and Zimbabwe. The SACU countries share a common excise tax policy as well as a common external tariff. There is free movement of goods and services within the borders of the customs union. This means that all alcohol products are levied with the same excise taxes no matter where they are produced. The countries apply the same import tariffs on products imported from outside the customs union. Excise tax and customs revenues collected in the five countries are collected in a Common Revenue Pool, which is subsequently shared according to a revenue sharing formula.

SACU members have somewhat different rates of Value-added Tax. This, together with differences in supply chain and marketing costs would result in somewhat different prices, but generally retail prices on alcohol in the SACU region should be broadly similar, given the high degree of economic integration in the region. One country, Botswana, imposed an alcohol-specific levy of 30% in 2008 and increased it to 40% in 2010, resulting in a substantially higher total tax burden than in neighbouring countries.

Whereas the excise tax on alcohol in the SACU countries is levied as a specific tax, the structures are quite different in Mozambique and Zimbabwe. Mozambique has a pure ad valorem system while the Zimbabwean tax system is a combination of both ad valorem and specific taxes. These differences in tax structures complicate any comparison between South Africa and the non- SACU countries.

It is difficult to compare prices of alcohol products across borders in the Southern African region due to a lack of data. The price of alcohol in Botswana should be higher than other SACU countries due to the additional levy, but it is not clear whether the levy is fully passed onto consumers or whether it is partially borne by the producer and/or other firms along the supply chain.

Trends in prices in Namibia and South Africa show that prices grew at a similar rate over a long period of time although there were year-on-year differences.

Alcohol prices in South Africa and Zimbabwe are broadly similar. While beer and wine were historically cheaper in Zimbabwe than South Africa, more recent data show that beer and wine are now more expensive in Zimbabwe than in South Africa. The prices of spirits in South Africa and Zimbabwe are similar.

South Africa has a relatively open international trade market for alcohol. In particular, South Africa exports a lot of wine to Europe. South Africa also has significant trade links with its neighbouring countries. It also exports substantial quantities of beer, spirits and wine to its neighbours, especially Namibia, but imports very little alcohol from them. The only exception is Namibia, from which South Africa imports large quantities of alcohol, mainly beer.

South Africa and Botswana have the highest per capita consumption of alcohol in the region by far. South Africa had the highest per capita consumption of the countries in the region, but was overtaken by Botswana in 2006. Whether the Batswana alcohol levy will reduce consumption significantly, needs to be seen.

Per capita consumption in South Africa is nearly double that of Namibia and Zimbabwe, and nearly triple that of Lesotho and Mozambique. However, other than Zimbabwe, South Africa has the highest rate of alcohol abstention in the region. The implication is that those who drink alcohol do so at substantially higher rates in South Africa than anywhere else in the region. This is problematic, and it is thus no surprise that the harm caused by alcohol abuse in South Africa is amongst the highest in the world.

THE ECONOMICS OF ALCOHOL POLICY IN SOUTH AFRICA

CHAPTER 1

Introduction

EVAN BLECHER
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INTRODUCTION

Alcohol use is deeply embedded in South African culture and history. A significant and powerful alcohol industry exists in South Africa with its own deep roots in the country's business history. Some alcohol brands have become almost symbolically associated with certain aspects of South African society and life. However, while alcohol contributes to society in many ways, it also burdens society with significant costs through injuries, diseases and social ills. The balance between the contribution to society and the economic and social costs of alcohol use and particularly harmful use of alcohol is not straightforward, since, in addition to the economic contribution from alcohol, some even posit a potential health and social benefit from responsible drinking. This creates the possibility of an optimal level of alcohol consumption for some individuals and for society in the aggregate. The government has an important role in achieving this balance by developing policy and regulating the industry and consumers in such a manner as potentially to achieve these optimal levels or at least to move towards them. This is a difficult balance and one that must take into account a number of important political, economic and social factors. Society as a whole generally supports the need for government to intervene, as is evidenced by the general understanding of the necessity of not allowing children to purchase alcohol, requiring licenses for selling alcohol and outlawing drunk driving. South Africa is at a crossroads: the significant economic, health and social cost is being considered too high by the government and the government is embarking on a path to strengthen policy and the regulation of alcohol use.

The history of alcohol production and use in South Africa dates back to the arrival of the Dutch in Cape Town in the 17th century. Cape Town was established as a refreshment station for the Dutch on the trading routes between Europe and Asia. Although generally the provision of food and fresh water was the main purpose of the refreshment station, wine growing also began in the Cape at that time. Additionally, trading of alcohol for cattle and even labour occurred. Wine production expanded in the Cape Colony with the arrival of French Huguenots later in the 17th century.

In later years alcohol became part of the economic fabric through the "dop system". Agricultural workers, especially in the Western Cape and Northern Cape were partially paid in wine, resulting in them being held captive by the addiction. The "dop system" resulted in increasing alcoholism and wide-scale damage. Although it was outlawed in 1960 the practice was only ended in the 1990s. The "dop system" is responsible for large-scale abuse of alcohol and for perpetuating a culture of alcohol use and alcoholism in rural areas and especially amongst Coloured communities.

During the apartheid years race also began to play a role in alcohol use. Restrictions and bans on alcohol use among Blacks were evident. Additionally, the development of urban townships to house Black labour in cities without sufficient infrastructure assisted in the development of informal markets to deliver alcohol. With the rise of shebeens, as they are known in South Africa, there was little to no regulation of the sale and use of alcohol in townships.

Alcohol use in South Africa has traditionally been dominated by beer, with every third man drinking it. The trend in beer, however, has remained relatively unchanged since the early 2000s. Beer has the highest "gender gap" (the difference between male and female drinking) of all alcohol products in South Africa. While the prevalence of beer drinking has remained relatively unchanged, there have been considerable changes in the prevalence of other alcohol products. Flavoured alcohol beverages, often referred to as FABs, have seen considerable growth. Currently, one fifth of South Africans drink FABs. Much of this growth has occurred among the female population where prevalence stands at 21%. Another product which has shown increases in prevalence is liqueur. The changing nature of alcohol use in South Africa is

also seen by the decline in prevalence of some alcohol products, such as sorghum beer and white spirits. The decline in the prevalence of sorghum beer is especially important given the traditional nature of sorghum beer use and the role that sorghum beer plays in the unrecorded market and informal sector. These trends suggest a move towards higher value "popular" drinks, and a movement away from lower value and traditional alcohol products.

Underage drinking is a particular policy concern. Other than the direct health impact and the impact on development, drinking at younger ages increases the potential long-term costs to society. Underage drinking in South Africa occurs at significant levels and there has been strong growth in new alcohol products, including FABs which may have greater appeal to adolescents. Underage drinking reaches prevalences similar to adults for flavoured alcohol beverages in some income groups. For instance, underage drinking prevalence (15-17 years) in Living Standard Measure (LSM) categories 5 and 6 is 19%. Other alcohol categories where underage drinking is high include liqueur, beer and spirits.

The World Health Organization's African region is seen to have the highest levels of alcohol consumption in the world, with 16.6 litres of pure alcohol consumed per drinker per annum. While South Africa is lower than this at 10.0 litres of pure alcohol consumed per drinker per annum, drinking patterns in South Africa are far more concentrated with only 31% of South Africans drinking alcohol. Furthermore, the pattern of drinking in the World Health Organization's African region scores a 3.1 out of 4 on the scale of hazardous drinking, indicating that there is greater harm per litre of alcohol consumed than in other regions. The World Health Organization considers the riskiness of drinking in South Africa to be amongst the highest in the world, comparable to Kazakhstan, Mexico, the Russian Federation, and the Ukraine (WHO, 2011). For these reasons, South Africa experiences costs and externalities above global averages, especially in the area of acute conditions.

The negative externalities linked to the harmful use of alcohol include increased health expenditures and costs related to crime, labour and productivity costs, and non-financial welfare costs. In South Africa, acute conditions related to alcohol use, namely intentional (19%) and unintentional injury (16%) cause the highest percentage of disability adjusted life years (DALYS) related to alcohol use. Alarmingly, around 60% of all interpersonal violence, transport fatalities and burns can be attributed to alcohol consumption. In addition to the costs related to injuries, harmful alcohol use also contribute significantly to the burden of infectious diseases, particularly tuberculosis and HIV/AIDS, contributing 19% and 13%, respectively, to the alcohol-related DALYs.

The costs to society also include the fiscal costs, borne by government, related to alcohol use and misuse. These include costs related to treating diseases and injuries resulting from the harmful use of alcohol, as well as costs incurred by the justice system in dealing with alcohol-related crime. Given the massive health impact of alcohol use and misuse, it comes as no surprise that the South African National and Provincial Departments of Health faced the highest direct cost from alcohol, of all government departments in 2009/2010, at around R6.8 billion, with Safety and Security following closely at R5.8 billion (Budlender, 2010). Correctional Services bore the third-largest alcohol-related cost, at R3.4 billion.

Other externalities include labour and productivity costs, such as absenteeism, and non-financial welfare costs such as personal suffering or noise pollution, which are difficult to measure but are listed in this study as they represent significant costs of alcohol misuse.

While the traditional policy mechanisms for controlling alcohol use in South Africa have been the limiting of access to alcohol through age restrictions, the requiring of licenses to sell alcohol products, and excise

taxes, the focus of policy has now also moved towards the marketing of alcohol products. The first such policy measure was to require health warning labels on alcohol, which was implemented in 2009.

One of the most hotly contested policy issues in South Africa at the moment is the advertising of alcohol products. The South African government, through the Minister of Health, has proposed, as part of a comprehensive attempt to reduce the harms of alcohol to society, to ban the advertising of alcohol products in South Africa. The issue has been controversial even amongst government members, with some Ministries, including the Ministry of Sport and Recreation and the Ministry of Trade and Industry, opposing the implementation of the ban on the grounds that it would weaken the economy and result in job losses. The Ministry of Health, supported by the Ministry of Basic Education and the Ministry of Social Development, has championed the ban on the basis that it will reduce alcohol consumption and therefore reduce the harmful use of alcohol. Significantly, it is expected to impact on alcohol use and uptake among young people.

The alcohol industry, including its allied industries in advertising and media (the recipients of the advertising spend), have lobbied very aggressively against the ban. They argue against the implementation on two, possibly three, grounds. Firstly, they argue that the ban will not be effective. Secondly, they argue that whether or not it is effective in reducing alcohol harm it will cause significant harm to the economy through job losses. And thirdly, the banning of advertising is not legal since it restricts freedom of speech. Other ancillary arguments include that it will somehow result in increased illicit trade in alcohol products. All these arguments are very familiar, and were the same as those used by the tobacco industry in their opposition to the development of similar policies in the last two decades. The industry would rather continue the voluntary measures and light measures currently in place to warn of the danger of alcohol use, through health warnings on material that advertises, promotes and markets alcohol products, as well as through industry-funded advocacy and communication programs.

This is not a new proposition, as alcohol control policy is evolving from tobacco control policies in South Africa. As part of its comprehensive tobacco control policy South Africa has implemented a now comprehensive ban on tobacco advertising, promotion and sponsorship. While it is difficult to disentangle the effect of the advertising ban from the larger package of tobacco control policies, including public smoking bans, youth access laws, health warnings, and tax and price policies, the package as a whole has been very effective in reducing tobacco use. In 1993, 33% of South Africa adults smoked while contemporary data suggests that this is now approximately 20%. This 13 percentage point decline means that there are 4 million fewer adult smokers now than there would have been in the absence of tobacco control.

While advertising bans are an important factor in comprehensive tobacco and alcohol control policies, tax and price measures are also considered an integral part. One of the most significant determinants of the demand for any product is the price. As price rises, consumers are willing and able to purchase less of a product and hence their quantity demanded falls. Economists refer to this as the law of demand and it is one of the fundamental principles in economics. The responsiveness of the quantity demand to changes in price is the price elasticity of demand, or the percentage change in quantity as a result of a one percent change in price. One of the purposes of this study is to investigate this price elasticity of demand and to support the argument that higher prices may reduce the demand for alcohol in South Africa. This is particularly important when considering that specific populations are likely to have different price elasticities. For instance, we know that the poor and young are likely to be more responsive to price changes and therefore would reduce their consumption more than the average person would.

But what are the policy implications of higher prices? Is government able to influence prices in such a manner that alcohol use and misuse are reduced? Alcohol, like tobacco, is generally a product on which governments levy excise taxes. Excise taxes are taxes levied on specific products. Government usually either has an interest in reducing or controlling the consumption of the products, such as alcohol, tobacco and fuel, or considers them efficient for revenue generation, such as luxury goods. There is significant experience globally, and specifically in South Africa, in using excise taxes as a policy tool for tobacco control. However, alcohol has a far more complex market than tobacco, given its greater heterogeneity, and thus while cigarettes are easy to tax (easy in that it is not complex to design a tobacco tax policy to achieve the complementary goals of reduced consumption and increased revenue) alcohol can be more difficult. Furthermore, tobacco use has no optimal level of consumption with respect to health, and a tax policy on tobacco may be designed to reduce tobacco use as much as possible. There is no clear evidence, however, that there is no optimal level of alcohol consumption and thus the goal of tax policies on alcohol may be different from those for tobacco, in that rather than reducing use as much as possible the goal of the policy may be rather to reduce and eliminate heavy drinking or drinking that results in some individual or societal harm without discouraging or overly discouraging responsible, healthy or legitimate use.

Nevertheless, it is important for alcohol policy to learn from that of tobacco in South Africa. Since 1993, excise taxes have increased in real terms (i.e. inflation adjusted) every year. The result is that, between 1993 and 2012, excise taxes per unit have risen by 493% and retail prices have risen by 196%. Aggregate consumption declined by 38%. Although the industry has claimed that illicit trade has undermined tobacco control policy there is no reason to accept this, given that smoking prevalence (which includes illicit cigarette smoking) has declined to such an extent while government's revenue from taxation has also risen significantly. The inelastic nature of the demand for tobacco meant that the increases in unit taxes resulted in the decline in consumption being less than proportional to the tax and price increases. The result is that excise tax revenue grew by 270% during the same period, assisting government in correcting the externality but also compensating them for the significant costs they incur preventing and treating tobacco related diseases.

While tobacco taxation is a good model for alcohol taxation, alcohol is a far more complex issue than tobacco. Besides having more social and economic dimensions than tobacco, significantly greater complexity is created through the heterogeneity of the products and the ability for one to brew one's own alcohol products. There has been much public discussion about the illicit trade in alcohol products and unrecorded alcohol use. The report considers this problem in detail and attempts to open up the discussion more broadly. The report draws a distinction between products on which tax has been paid and those on which tax has not been paid.

This report is comprehensive and considers the economics of alcohol use and misuse in South Africa. It consists of eleven chapters including the introduction and conclusion. Chapter 2 considers trends in the prevalence of alcohol use by product and province. The trends in prevalence indicate to us the proportion of the population and sub-populations which use various alcohol products. Trends over time are considered, and an analysis is made of contemporary alcohol use. Chapter 3 considers aggregate consumption of alcohol products and analyses these trends over time, as well as the trends in excise taxes and excise tax revenues since the 1960s. Chapter 4 considers trends in the prices of various alcohol products over time. This is critically important given that tax policies are intended to affect prices and that prices are amongst the most important determinants of alcohol demand. Chapter 5 provides a broad review of the externalities of alcohol use and misuse in South Africa. Chapter 6 provides an analysis of

alcohol affordability. This chapter considers the trends in affordability of various alcohol products in South Africa over time, but also provides a context where price and the affordability of alcohol products are compared to other countries in the world, particularly other low- and middle-income countries. Chapter 7 conducts a literature review of the demand for alcohol products in both a domestic and international context, paying particular attention to other low- and middle-income countries. Chapter 8 conducts original econometric research to estimate the price and income elasticities of demand for alcohol products in South Africa, using both time series and cross-sectional techniques. Importantly, this chapter also considers the policy implications, particularly for taxation, of the elasticity estimates. Chapter 9 investigates the illicit trade in alcohol products in South Africa and provides an important definitional analysis of different forms of illicit trade, and particularly forms which result in tax avoidance and evasion. It also provides a useful distinction between the broader, traditional definition of unrecorded transactions and the narrower, more worrying definition of illicit trade. Chapter 10 then considers the broader context of alcohol use in the Southern African region and provides some context for the broader regional policy implications of South African alcohol control policy.

The report is written as an omnibus report covering a very broad range of issues; however, it is also written in such a manner that each chapter is able to provide a separate analysis on more detailed topics. While the focus of the report is South Africa and the emphasis on data and research is South African the report also draws upon international examples and experiences.

The report was commissioned by the World Health Organization South African country office in order to increase the evidence base and support the development of country-level policies to assist in the reduction of harms related to alcohol use and misuse. The call for proposals issued on 25 April 2013 is included in an appendix.

This report has been put together in a relatively short time and as a result we have required significant assistance from a broad team of colleagues. We would like to acknowledge the funding from the World Health Organization South African country office. We would also like to acknowledge the assistance of Dr. Sarah Barber and Tomas Roubal, both from the World Health Organization South African country office, for their strategic, administrative and technical guidance and direction and their many substantive comments on this report at various stages. Secondly, we would like to acknowledge the contribution of Professor Charles Parry from the Medical Research Council who has provided valuable comments and suggestions. Nicole Vellios provided invaluable administrative support while Jodie Posen managed the research process for us. Other people who have contributed to this study in earlier stages include Michele Cecchini, Riaan Labuschagne, Savera Kalideen and Yussuf Saloojee. Their useful comments are gratefully acknowledged.

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APPENDIX

CALL FOR PROPOSALS – ALCOHOL ECONOMICS IN SOUTH AFRICA

BACKGROUND

Globally, harmful alcohol consumption[i] is the third most important risk factor contributing to non-communicable diseases, injuries, and communicable diseases.[ii] Alcohol use is a major underlying factor in homicides, violence, road traffic deaths, suicides, and other, unintentional injuries across South Africa. More than one in four (25.9%) South Africans report having driven a motor vehicle after drinking alcohol.[iii] In addition, more than half (57.7%) of tested homicide cases had high blood alcohol concentrations.[iv] Harmful and excessive alcohol consumption also contributes to non-communicable conditions, including cardiovascular diseases, cirrhosis of the liver, and cancers. In addition, alcohol consumption during pregnancy is responsible for high rates of fetal alcohol syndrome in some communities.[v]

The WHO Global Status Report on Alcohol and Health ranks South Africa as among the top five countries globally for its risky patterns of alcohol drinking, and the highest in Africa.[vi] Among those who consume alcohol, the prevalence of heavy episodic drinking (HED) was reported as 48.1% among men and 41.2% among women.[vii] Consumption of alcohol in South Africa amounts to 9.5 litres per adult annually on average, compared with the African regional average of 6.2 litres per person annually.[viii]

Policies exist for preventing the harmful use of alcohol.[ix x] Increasing alcohol taxation is globally considered to be one of the most effective strategies in reducing alcohol consumption. There has been an increase in alcohol excise duty in South Africa since 2003, but prices remain low.[xi] Excise duties range from 6% to 20% by type of product. Excise plus VAT also varies by type of product – approximately 23%, 33%, and 43% of retail price for wine, clear beer and spirits, respectively. Variation by type of product allows people to switch to cheaper products in response to a price increase. There is also a need to address 'unrecorded' alcohol, produced at home or otherwise falling outside of governmental regulatory measures. Thus the tax structure must also be considered in order for a tax increase to have an impact on consumption.

WHO member states have committed to addressing the harmful use of alcohol, through methods including the implementation of price and tax measures. The World Health Assembly Resolution 63.13[xii] and the Global strategy to reduce harmful use of alcohol[xiii] were endorsed by the 63rd World Health Assembly in May 2010. The Regional Strategy to reduce the harmful use of alcohol (AFR/RC60/4)[xiv] aims to contribute to the prevention and reduction of the harmful use of alcohol and related problems in the African Region.

CALL FOR PROPOSALS

The WHO in South Africa seeks proposals for empirical research to estimate the consequences of a change in alcohol price and tax measures on the population and the economy of South Africa. The proposals should cover one of the following topics:

1. Estimation of the demand for alcohol (by type of alcohol product), and modelling the impact of tax and price increases (price and income elasticities) on alcohol consumption, household expenditures and government revenues.
2. Evaluation of the impact of tax and price increases on industry related to alcohol production – employment, sales and market structure – and the input-output analysis of the whole economy.
3. Factors in determining the excises for alcohol, trends in government revenues from alcohol taxes (in South Africa and abroad), and issues related to tax administration.
4. Market failures related to alcohol consumption, costs to individuals, households and the whole society – theory and practice in South Africa focusing on historical and current tax and tariff structures by type of alcohol product, trends in taxes and real prices over time, affordability of alcohol products and its consequences.
5. Relationships between alcohol consumption and the burden of disease and economic productivity.

EVALUATION OF PROPOSALS

1. Priority for funding will be based on the list above, with 1 as the highest priority
2. Proposals will be evaluated based on:
   a. Prior experience of researcher/research team in relevant areas (30%)
   b. Theoretical and empirical methods, sources of information, years of analysis, and approach to addressing the point in the ToRs concerned (50%)
   c. Detailed budget breakdown, timeframe and justification (20%)

DELIVERABLES

1. Draft paper for peer review at least two months before contract ends (50%)
2. Final paper with reviewer comments satisfactorily incorporated (50%)

Timeline: All contract deliverables must be completed by 30 November 2013
Proposal submissions accepted in electronic form only to: hr@za.afro.who.int
Please include all information required to evaluate the proposal in your submission
Please include in the subject line: Alcohol Economics
Deadline for submission of proposals: May 20, 2013

A CONFLICT OF INTEREST STATEMENT DECLARING ANY FINANCIAL OR PERSONAL ASSOCIATIONS WITH THE ALCOHOL INDUSTRY MUST BE MADE WITH THE PROPOSAL SUBMISSION.

REFERENCES

i. 'Hazardous pattern of drinking' is the presence of heavy drinking occasions, defined as consumption of 60 or more grams of pure alcohol.

ii. Global strategy to reduce the harmful use of alcohol http://www.who.int/substance_abuse/alcstratenglishfinal.pdf

iii. Reddy SP, James S, Sewpaul R, Koopman F, Funani NI, Sifunda S, Josie J, Masuka P, Kambaran NS, Omardien RG.

iv. Umthente Uhlaba Usamila - The South African Youth Risk Behaviour Survey 2008. Cape Town: South African Medical Research Council; 2010, http://www.mrc.ac.za/healthpromotion/healthpromotion.htm

v. Mohamed Seedat, Ashley Van Niekerk, Rachel Jewkes, Shahnaaz Suffla, Kopano Ratele. Violence and injuries in South Africa: prioritising an agenda for prevention; Lancet 2009; 374: 1011–22.

vi. Epidemiology of fetal alcohol syndrome in a South African, www.ncbi.nlm.nih.gov/pubmed/11111264

vii. World Health Organization. Global status Report on Alcohol and Health 2011. www.who.int/substance_abuse/publications/global_alcohol_report/en/index.html

viii. HED is defined as drinking 60 grams or more of pure alcohol on at least one occasion in the past 7 days, and is an important indicator for the health consequences of alcohol use, such as injuries.

ix. World Health Organization. Global status Report on Alcohol and Health 2011. www.who.int/substance_abuse/publications/global_alcohol_report/en/index.html

x. WHO Expert Committee on Problems Related to Alcohol Consumption, http://www.who.int/substance_abuse/expert_committee_alcohol/en/index.html

xi. Alcohol: No Ordinary Commodity: Research and Public Policy http://www.amazon.co.uk/Alcohol-Ordinary-Commodity-Research-Public/dp/0199551146/ref=dp_ob_title_bk/278-5383585-2344548#reader_0199551146

xii. Trends in alcohol prevalence, age of initiation and association with alcohol-related harm among South African youth: Implications for policy, http://www.samj.org.za/index.php/samj/article/view/5766/4281

xiii. http://www.who.int/substance_abuse/activities/globalstrategy/en/index.html

xiv. Global strategy to reduce harmful use of alcohol http://www.who.int/substance_abuse/alcstratenglishfinal.pdf

xv. Reduction of the harmful use of alcohol - Regional Office for Africa www.afro.who.int/index.php?option=com_docman&task=doc_download&gid=5622

THE ECONOMICS OF ALCOHOL POLICY IN SOUTH AFRICA

CHAPTER 2

The Prevalence of Drinking in South Africa: An Analysis of the All Media Products Survey

JODIE POSEN
MICHAEL DALY

THE PREVALENCE OF DRINKING IN SOUTH AFRICA: AN ANALYSIS OF THE ALL MEDIA PRODUCTS SURVEY

1. INTRODUCTION

1.1 DATA ON DRINKING PREVALENCE

This chapter is based on an analysis of alcohol prevalence trends obtained from a commercially generated database, the All Media and Products Survey (AMPS). The AMPS is compiled by the South African Advertising Research Foundation (SAARF), an organisation funded by the Marketing Industry Trust, whose main objective is to direct and publish media and product research. Regular surveys are conducted on a random sample of between 15 000 and 31 000 respondents. The present study covers the period 2001 to 2012. The primary aim of the AMPS data is to provide businesses with information regarding consumer trends in advertising and the mass media, as well as product usage for a variety of products. In investigating trends in drinking patterns, the AMPS database has three major advantages:

(1) it is much cheaper than generating data by means of large-scale national surveys that are focused on drinking;

(2) because the questions regarding product usage do not change from one year to the next, trends in drinking prevalence can be meaningfully investigated; and

(3) the survey is performed regularly – at least once a year.

The disadvantage of the AMPS database is that the focus is limited. The only relevant information for alcohol concerns "product usage" in a limited time frame whereas opinions about drinking, alcohol policies and the negative externalities associated with alcohol consumption are not incorporated in the surveys (van Walbeek, 2002). Respondents to the AMPS survey are asked how many drinks they consumed in a particular time period. The questions used to extract the data for this section are listed in Appendix 1. Based upon the number reported, a person is classified as either a light, medium or heavy user of that particular beverage. The time periods concerned, measure used and classification are reported in the table below:

TABLE 1: *DEFINITION OF USE FOR DIFFERENT ALCOHOL CATEGORIES*

PRODUCT	TIME PERIOD	MEASURE	LIGHT	MEDIUM	HEAVY
Beers					
Beer	Past 7 days	Bottles/cans/glasses	1 - 2	3 - 5	6 +
Sorghum beer	Past 7 days	Cartons	1	2 - 3	4 +
Spirits					
Brandy	Past 7 days	Tots	1	2 - 3	4 +
Whisky	Past 7 days	Tots	1	2 - 3	4 +
Rum	Past 7 days	Tots	1	2 - 3	4 +
White Spirits					
Cane	Past 7 days	Tots	1	2 - 3	4 +
Gin	Past 7 days	Tots	1	2	3 +
Vodka	Past 7 days	Tots	1	2 - 3	4 +

Wine					
Fortified wine	Past 7 days	Glasses	1	2	3 +
Natural table wine (boxes)	Past 7 days	Glasses	1	2 - 3	4 +
Natural table wine (corked bottles)	Past 7 days	Glasses	1	2 - 3	4 +
Sparkling wine/Champagne	Past 4 weeks	Glasses	1	2	3 +
Other					
Flavoured alcoholic beverages	Past 7 days	Bottles/cans/glasses	1	2 - 3	4 +
Liqueur	Past 7 days	Glasses	1	2	3 +

Source: *SAARF, 2013*

The above definitions are used by AMPS within the context of their marketing focus. They do not suggest that "heavy" consumption is necessarily harmful or hazardous. A beer a night is not problematic but it will be classified as "heavy" consumption, whereas six beers on one night could be problematic. The limitations of this definition must be noted, especially when examining the heavy drinking prevalence figures.

1.2 METHODOLOGY

The SAARF weight the data to represent the South African population using Cohort-Component Population Projection methods and the ratio method. AMPS weights are constructed using population estimates from the IHS Global Insight Regional eXplorer suite of models. A unique cohort component model is constructed for each population group and province, resulting in 45 distinct models (nine provinces times five racial groups). These models take into account demographic literature, calculations based on census data (and other surveys where available) and are tested for empirical consistency (SAARF, 2013). Although the IHS Global Insight population includes 5 race groups, namely Black, Coloured, White, Indian and Other, the AMPS analysis does not include Other in the analysis.[1] The AMPS data include all adults aged 16 years and older for the period 2001 to 2008. From 2009, the survey was expanded to include all people aged 15 years and older, thereby adding 975,000 to the adult population. This addition does not affect our trend analysis in any significant way.

For any product, demographic or income category, the drinking prevalence percentage is defined as the number of respondents who declare alcohol usage, expressed as a percentage of the population in that category. Alcoholic products reviewed here are separated into four broad categories: (1) beers, including regular and sorghum beers; (2) wines, including boxed, corked, fortified and sparkling wine; (3) spirits, including brandy, rum, whisky and white spirits (cane, gin and vodka); and (4) flavoured alcoholic beverages (FABs) and liqueurs.

While AMPS data has its weaknesses, it is consistent and frequent. These two characteristics make AMPS data useful for trend analysis and allow one to identify demographic and socio-economic shifts in alcohol consumption over time. The AMPS data also has a large sample, ensuring reliable data that has been weighted to reflect the South African population.

[1] This report follows the racial categorisation that hails from South Africa's apartheid past, but that is still used in South Africa today (even though it is no longer based on legislation). 'Black' (or 'African') refers to people of indigenous African origin; 'White' refers to people of European origin; 'Indian' refers to people of an origin in the Indian sub-continent (both modern-day India and Pakistan) and 'Coloured' refes to people of mixed origin. This could be a mix of Black and White, but more often Coloureds include people of Indonesian origin (through slaves brought in by the Dutch East India company), hunter-gatherers found in South Africa before the European settlement of the Cape, often mixed with White and/or Black. In contrast to the US where 'Coloured' is a derogarory term for 'African-Americans', the term is not derogatory in South Africa. Whites in South Africa have the highest per capita incomes, followed by Indians, Coloureds and Blacks, in that order. Most Whites and Black indicate their religion as Christian. A sizeable proportion of Indians and Coloureds are Muslim.

The main weakness of the AMPS data can be found in the nature of the question, that is, “How much alcohol has been consumed in last 7 days?” Someone who has not drunk beer in the last week but perhaps drinks every now and then would be recorded as a 'never' user under AMPS methodology, resulting in an underestimation of true alcohol prevalence figures. There is also a likely under-reporting in surveys of this kind due to the social stigma attached to heavy drinking. The AMPS data also does not provide total alcohol prevalence at an atomised level. For example, it is not possible, using the data that is in the public domain, to calculate what percentage of the population consumes alcohol and the quantity of pure alcohol that they consume. Alcohol drinkers are likely to each drink a number of different drinks and the AMPS results do not easily allow one to detect the degree of overlap. Furthermore, even though the threshold for “heavy consumption” of any individual category is set quite low (according to AMPS definitions), a person who consumes multiple types of drinks could easily be regarded as a problem drinker. Unfortunately, the data do not allow one to identify such drinkers. Thus we urge caution in interpreting the results of this chapter.

Because of sampling and measurement error, the data are subject to random short-term variations. Given that this chapter focuses primarily on trends in drinking prevalence in the past week and heavy drinking prevalence, the variations were suppressed using regression techniques. Because the observed trend in the drinking prevalence percentage is linear for most socio-economic and demographic categories, the following model was employed (van Walbeek, 2002):

$$\mathbf{Y_t = a + bt + e_t}, \qquad (1)$$

where $\mathbf{Y_t}$= drinking prevalence percentage of the product by socio-economic indicator under investigation;

a = constant, equal to the regressed value of the drinking prevalence percentage for the relevant product and socio-economic indicator in the base year (2001, unless otherwise stated);

b = trend coefficient, i.e. the average annual increase in the drinking prevalence percentage;

t = trend variable, equal to 1 in the first year, 2 in the second, etc.; and

$\mathbf{e_t}$ is the error term.

The focus of this chapter is on the trend in alcohol consumption and prevalence, that is, coefficient **b**. The interpretation of the coefficient is intuitive: it indicates the annual average growth in the proportion of the population who consume the product of interest. Thus if **b** takes on a value of 0.4, it implies that over the period 2001-2012, the prevalence of drinking of that beverage increased by 0.4 percentage points each year, ignoring anomalies in the data from sampling error, etc. Thus over the twelve-year period (2001-2012), prevalence of use would have increased by about 4.8 percentage points (i.e. 12 x 0.4 percentage points). Should b be negative, this implies a decrease in prevalence of use.

The slope coefficient **b** is tested for statistical significance using standard statistical techniques. One is more likely to find statistically significant slope coefficients if (1) the trend has been pronounced (upwards or downwards) and (2) the changes have been consistent over time and not subject to large variations from year to year. Where the slope coefficients are significant, this is indicated as follows: * = 10% level; ** = 5% level and *** = 1% level. Figure 1 shows trendlines for beer, a product in the mature phase of the product life cycle and Figure 2 shows trendlines for FABs, a product in the growth stage.

FIGURE 1: *TRENDLINES OF THE PREVALENCE OF BEER, A MORE MATURE PRODUCT*

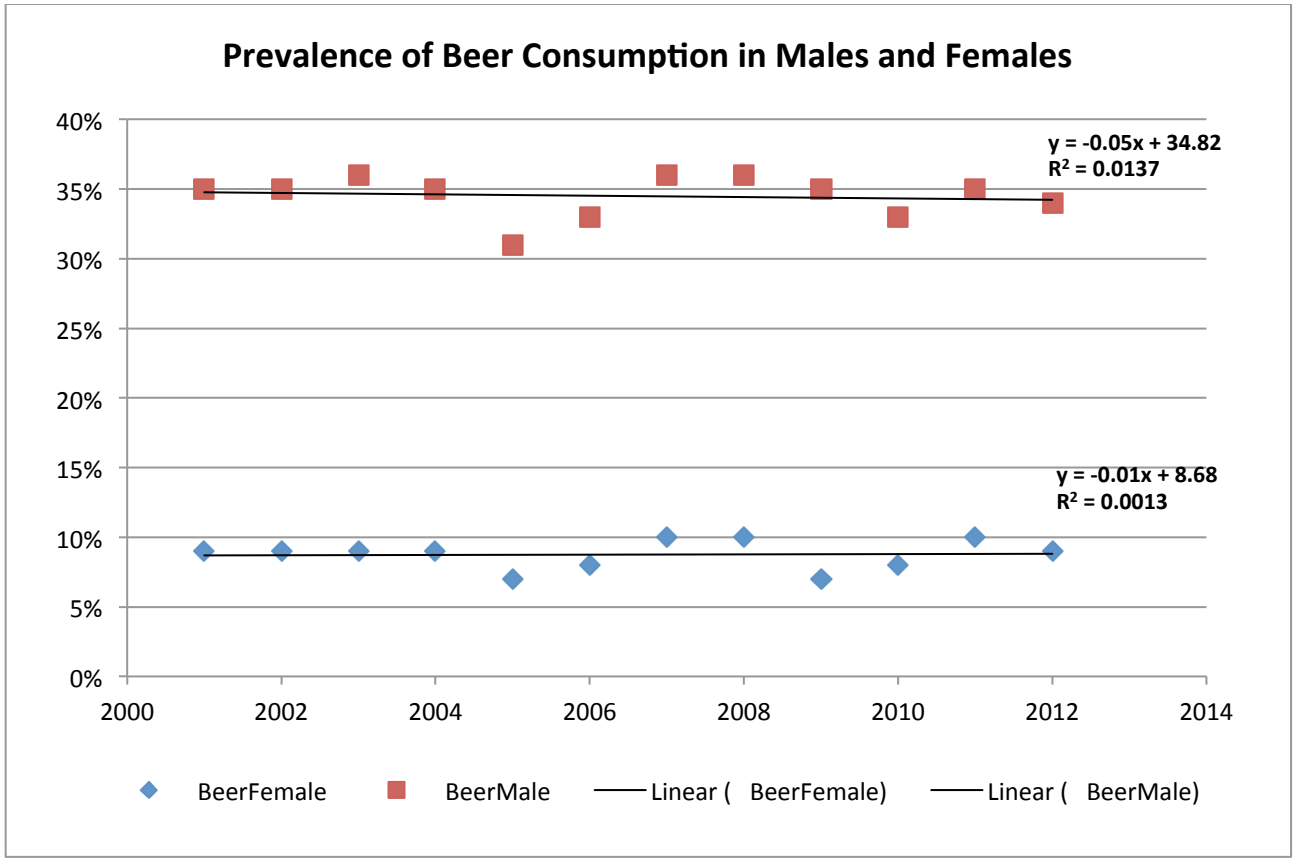
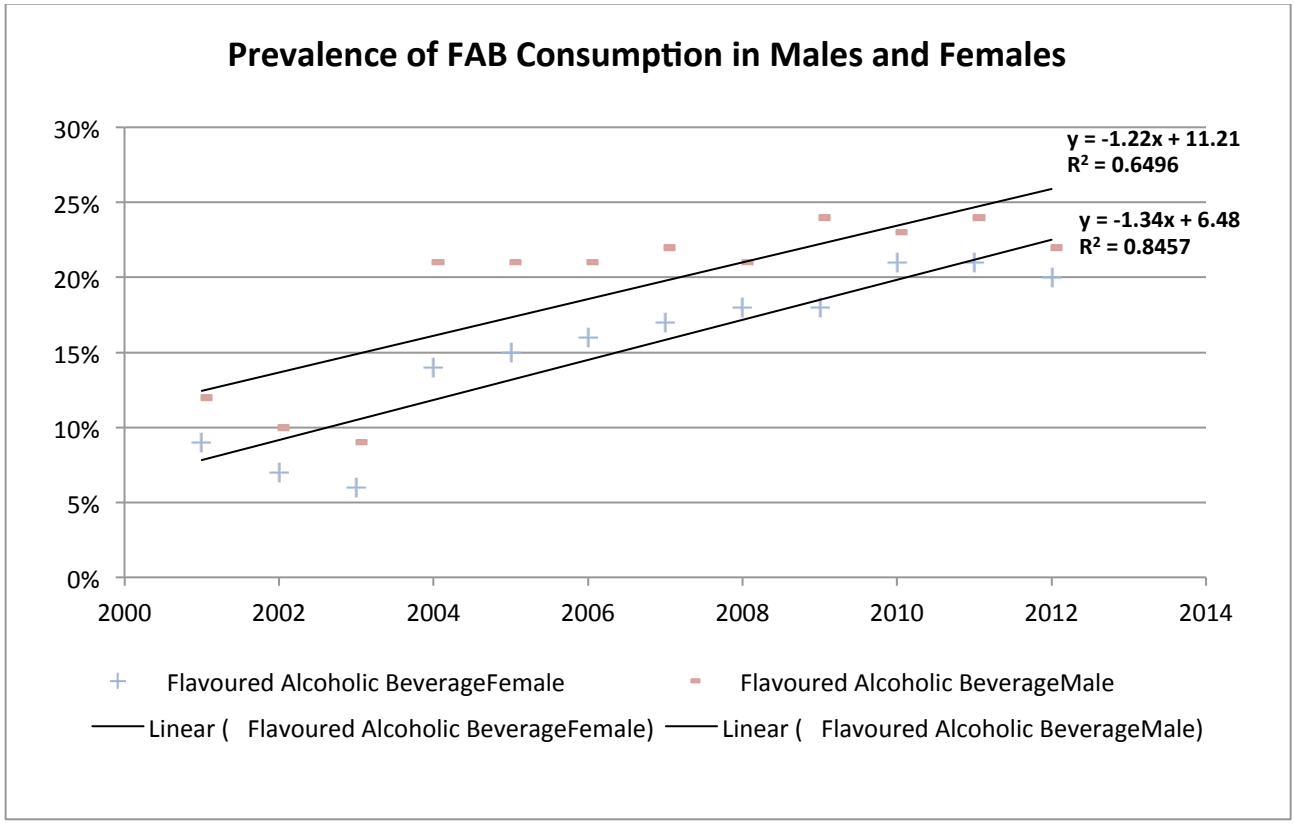


FIGURE 2: *TRENDLINES OF THE PREVALENCE OF FLAVOURED ALCOHOLIC BEVERAGES, A LESS MATURE PRODUCT*



As an example of the typical data, consider Figures 1 and 2. Figure 1 shows the prevalence of beer consumption for males and females (not disaggregated by any demographic, geographic or socio-economic variable). The trend is practically flat for beer consumption by both genders – typical of a mature market. The interpretation of the regression equation for males is as follows: the constant indicates that in 2001 the fitted prevalence of beer consumption was 34.82% among adults; the slope co-efficient indicates that between 2001 and 2012 the prevalence of beer drinking decreased by 0.05 percentage points per year. As a result the fitted prevalence in 2012 was 34.27% (34.82-0.05 x 11). This is not a significant change. Similarly, the prevalence of beer drinking among females did not change much between 2001 and 2012. It was at a fitted value of 8.68% in 2001 and increased by a negligible 0.01 percentage points per year over the 12 year period.

In contrast, Figure 2 indicates the prevalence profile of a beverage in a sharp growth phase. For both males and females, the prevalence of drinking FABs increased by more than 1.2 percentage points per year. The fitted prevalence percentage for males increased from 11.21% in 2001 to 24.63% (11.21 + 1.22 x 11) in 2012. The average prevalence of use in 2010-2012 is $\frac{1}{3}(23 + 24 + 22) = 23\%$, and in the tables that follow this is the number that is reported.

Careful inspection of Figure 2 reveals a structural break in 2005 for both genders, but especially for males. It is unclear whether there has been a real sudden increase in the consumption of FABs in this year or whether this is a data problem or an issue to do with changing definitions of the product category. We have not investigated such anomalies.

Also, in the tables that follow, we provide only summary statistics for the trends and 2010-2012 prevalences, rather than providing diagrams such as those in Figure 2. A clue that might suggest some volatility in the underlying raw data is if a trend with a "large" positive or negative slope is not as significant as one would expect it to be. For example, the slope of FAB consumption by males is only significant at the 5% level compared to the slope for females which is significant at the 1% level (see Table 2 on following page).

2. RESULTS

The highest overall prevalence of drinking was for beer (34% of males). Interestingly, from 2010-2012, the total prevalence and heavy prevalence of FABs (22%; 9%) is higher than that of beer (21%; 8%), traditionally the category with the highest prevalence in South Africa. The high prevalence and heavy prevalence of FABs among females (21%; 9%) is the driving cause of these changes. Tables 2 and 3 on following page give the overall prevalence of drinking in the past week and heavy drinking prevalence. This chapter will refer to 'prevalence' as the prevalence of drinking in the past week for all alcohol categories, apart from sparkling wine/Champagne which records drinking in the past four weeks, and 'heavy drinking prevalence' as the prevalence of heavy drinking in the past week as defined above. The table shows a generally declining trend for beer prevalence and a statistically significant increasing trend for FABs. Other alcohol categories with high prevalence levels include whisky (12%; 4%), brandy (11%; 4%) and liqueur (11%; 3%), with whisky and liqueur showing generally increasing and significant upward trends.

TABLE 2: THE OVERALL PREVALENCE OF DRINKING IN THE PAST WEEK

	AVERAGE PREVALENCE 2010-2012			AVERAGE ANNUAL CHANGE IN PREVALENCE PERCENTAGE 2001-2012		
	Female	Male	Total	Female	Male	Total
Beer	9%	34%	21%	0.01	-0.05	-0.06
Brandy	6%	17%	11%	0.13*	-0.33**	-0.05
Flavoured alcoholic beverages	21%	23%	22%	1.34***	1.22**	1.33***
Fortified wine	5%	5%	5%	0.08	0.02	0.07
Liqueur	9%	12%	11%	0.50***	0.40**	0.50***
Natural table wine (boxes)	7%	9%	8%	0.15**	0.03	0.09
Natural table wine (corked bottles)	9%	10%	9%	0.34**	0.26*	0.29**
Rum	3%	6%	5%	0.14***	0.12*	0.15**
Sorghum beer	3%	7%	5%	-0.08	-0.46***	-0.24***
Sparkling wine/Champagne	8%	7%	8%	0.36**	0.15	0.28
Whisky	7%	17%	12%	0.40***	0.84***	0.58***
White spirits	4%	8%	6%	0.07	-0.49**	-0.25*

Source: *AMPS (various years)*

TABLE 3: THE OVERALL PREVALENCE OF HEAVY DRINKING IN THE PAST WEEK

	AVERAGE PREVALENCE 2010-2012			AVERAGE ANNUAL CHANGE IN PREVALENCE PERCENTAGE 2001-2012		
	Female	Male	Total	Female	Male	Total
Beer	2%	15%	8%	-0.01	0.03	0.01
Brandy	1%	6%	4%	-0.02	-0.27***	-0.07
Flavoured alcoholic beverages	9%	10%	9%	0.75***	0.64**	0.67***
Fortified wine	1%	1%	1%	0.00	0.00	0.00
Liqueur	3%	3%	3%	0.14***	0.05	0.13**
Natural table wine (boxes)	2%	2%	2%	-0.01	-0.02	0.00
Natural table wine (corked bottles)	2%	2%	2%	0.15**	0.02	0.03
Rum	1%	1%	1%	-0.03	0.00	0.00
Sorghum beer	1%	2%	1%	0.00	-0.29***	-0.18***
Sparkling wine/Champagne	2%	2%	2%	0.14*	0.07	0.14*
Whisky	2%	6%	4%	0.09**	0.25***	0.22***
White spirits	2%	4%	3%	-0.01	-0.18	-0.08

Source: *AMPS (various years)*

The strong growth in liqueur is being driven primarily by a rapid increase in the reported consumption of Amarula (which makes up almost 50% of liqueur consumption). Southern Comfort also displayed strong annual growth, but only makes up slightly over 10% of liqueur consumption. Increases have been particularly strong in those under the age of 50.

The following tables tend to be long, given the many categories of alcohol that are identified. In order to save space and avoid unnecessary tedium, only some of the most important results are presented. Not all the results in the tables are discussed. The tables should be seen as a "reference list" for people who are interested in specific detail.

2.1 DEMOGRAPHIC AND SOCIO-ECONOMIC CHARACTERISTICS

2.1.1 GENDER AND GEOGRAPHIC DISPERSION

Males have higher drinking prevalence internationally, and are more likely to drink heavily than females. This also holds true in South Africa where, in most product categories, prevalence of consumption in the past week and heavy drinking prevalence is higher for males than for females. In a small number of product categories, however, female prevalence is higher, e.g. in fortified wine and sparkling wine/Champagne in Gauteng, heavy consumption of FABs in the Free State, North West and Northern Cape and boxed natural table wine in the North West.

The highest prevalence and heavy drinking prevalence in all provinces is for beer (between 26% and 41% for males and 4% and 15% for females), even though there are some generally declining trends (e.g. Eastern Cape, North West and Western Cape females) and some significantly declining ones (Kwazulu Natal and Western Cape males). Beer is followed by FABs (between 18% and 28% for males and 14% and 30% for females), whisky and brandy. Both FABs (all provinces) and whisky have statistically significant increasing trends in prevalence from 2001 to 2012, with FABs increasing between 0.75% and 2.27% per annum over the 12 year period. The Free State province has the highest total prevalence for the four products (beer, FABs, whisky and brandy), followed by North West, Gauteng and Northern Cape. Heavy drinking prevalence is highest in the Free State, followed by the North West, the Western Cape and Limpopo.

The products with the highest female prevalence are FABs, especially in the Free State province (30%), followed by liqueur in the North West (16%) and beer in the Northern Cape (15%). The prevalence of heavy drinking in females is found within the same product categories mentioned above, with very high heavy prevalence rates for FABs in the Free State (14%), North West (12%), Gauteng (12%) and Northern Cape (11%). These heavy prevalence levels exceed those of men for this category, indicating that the new products and marketing strategies aimed specifically at women in the FABs and liqueur categories have been successful from the industry's perspective.

For males, the products with the highest prevalence rates are beer (34%) followed by FABs (23%), brandy (17%) and whisky (17%). FAB prevalence trends are positive and significant for males in all provinces, indicating that this category has not only been successful in penetrating the female market but that the release of new products and aggressive marketing has also caused a rise in popularity among men.

The highest heavy drinking prevalence among males is recorded in Gauteng for beer (21%), Free State and Limpopo for FABs (13%) and Free State and Western Cape for brandy (9%).

Categories of alcohol that have experienced a significant increase in heavy prevalence of use include the following: FABs among both males and females in practically all provinces; and whisky among males in most provinces. There has been a significant decline in heavy prevalence of sorghum beer consumption among males in six provinces (but not the Eastern, Western and Northern Cape). This result corresponds with the findings, discussed in Chapter 3, that legal (i.e. tax paid) consumption of sorghum beer has been decreasing quite consistently over the past 20 years.

TABLE 4: THE PREVALENCE OF DRINKING IN THE PAST WEEK FOR EACH PROVINCE

	AVERAGE PREVALENCE 2010-2012		AVERAGE ANNUAL CHANGE IN PREVALENCE PERCENTAGE 2001-2012	
	Female	Male	Female	Male
Beer				
Eastern Cape	7%	29%	-0.18	-0.33
Free State	14%	41%	0.03	0.10
Gauteng	10%	39%	-0.08	0.15
KwaZulu-Natal	4%	26%	-0.20*	-0.62**
Limpopo	9%	34%	0.47**	0.83*
Mpumalanga	7%	35%	0.10	0.21
North West	10%	38%	-0.18	-0.10
Northern Cape	15%	40%	0.26	0.86*
Western Cape	12%	35%	-0.01	-0.36*
Total	**9%**	**34%**	**0.01**	**-0.05**
Brandy				
Eastern Cape	5%	17%	-0.06	-0.65
Free State	9%	21%	0.37*	-0.11
Gauteng	7%	19%	0.21**	-0.35
KwaZulu-Natal	4%	14%	0.06	-0.42**
Limpopo	5%	15%	0.28*	0.48
Mpumalanga	6%	19%	0.16	-0.30*
North West	8%	17%	0.36*	-0.08
Northern Cape	8%	19%	0.45*	-0.06
Western Cape	7%	18%	0.03	-0.46**
Total	**6%**	**17%**	**0.13***	**-0.33****
Flavoured alcoholic beverages				
Eastern Cape	14%	18%	0.93***	0.86**
Free State	30%	28%	2.27***	1.49**
Gauteng	25%	26%	1.39***	1.37***
KwaZulu-Natal	13%	21%	0.82***	1.12**
Limpopo	19%	25%	1.55***	1.63**
Mpumalanga	21%	27%	1.26***	1.20**
North West	29%	26%	1.92***	1.33***
Northern Cape	26%	23%	2.09***	1.57**
Western Cape	18%	19%	0.87*	0.75*
Total	**21%**	**23%**	**1.34*****	**1.22****
Fortified wine				
Eastern Cape	2%	6%	-0.07	0.06
Free State	7%	6%	0.43**	0.11
Gauteng	6%	5%	0.19*	0.07
KwaZulu-Natal	2%	3%	0.01	0.00
Limpopo	4%	5%	0.15	0.2
Mpumalanga	4%	3%	0.07	-0.14
North West	7%	5%	0.31*	0.03
Northern Cape	7%	7%	0.52***	0.24*
Western Cape	5%	7%	0.16*	-0.12
Total	**5%**	**5%**	**0.08**	**0.02**

	AVERAGE PREVALENCE 2010-2012		AVERAGE ANNUAL CHANGE IN PREVALENCE PERCENTAGE 2001-2012	
	Female	Male	Female	Male
Liqueur				
Eastern Cape	5%	8%	0.10	0.11
Free State	15%	16%	1.12***	0.74*
Gauteng	13%	14%	0.64***	0.53**
KwaZulu-Natal	5%	8%	0.27**	0.31
Limpopo	8%	13%	0.62***	0.88**
Mpumalanga	10%	14%	0.63***	0.76**
North West	16%	15%	1.23***	0.71***
Northern Cape	14%	11%	0.99***	0.66*
Western Cape	9%	11%	0.41**	0.25
Total	**9%**	**12%**	**0.50*** **	**0.40** **
Natural table wine (boxes)				
Eastern Cape	5%	9%	-0.03	0.00
Free State	9%	11%	0.21	0.3*
Gauteng	8%	8%	0.10	0.03
KwaZulu-Natal	5%	5%	-0.04	-0.17
Limpopo	7%	8%	0.36*	0.34*
Mpumalanga	7%	7%	0.06	-0.10
North West	11%	8%	0.43**	0.05
Northern Cape	12%	17%	0.66***	0.82**
Western Cape	7%	12%	0.06	-0.17
Total	**7%**	**9%**	**0.15****	**0.03**
Natural table wine (corked bottles)				
Eastern Cape	5%	8%	0.12	0.19
Free State	14%	13%	0.52*	0.51**
Gauteng	14%	12%	0.33	0.29*
KwaZulu-Natal	7%	8%	0.14	0.16
Limpopo	8%	7%	0.41*	0.39
Mpumalanga	9%	9%	0.22	0.22*
North West	13%	10%	0.45*	0.19
Northern Cape	10%	9%	0.77**	0.67
Western Cape	10%	11%	0.05	-0.15
Total	**9%**	**10%**	**0.34****	**0.26***
Rum				
Eastern Cape	1%	3%	-0.07	-0.27*
Free State	6%	9%	0.37**	0.35*
Gauteng	4%	7%	0.16*	0.20*
KwaZulu-Natal	2%	4%	0.07	0.13
Limpopo	3%	6%	0.17	0.23
Mpumalanga	4%	5%	0.10	-0.05
North West	5%	8%	0.19*	0.28*
Northern Cape	4%	8%	0.36***	0.15
Western Cape	4%	8%	0.25**	0.23**
Total	**3%**	**6%**	**0.14*****	**0.12***

	AVERAGE PREVALENCE 2010-2012		AVERAGE ANNUAL CHANGE IN PREVALENCE PERCENTAGE 2001-2012	
	Female	Male	Female	Male
Sorghum beer				
Eastern Cape	3%	11%	-0.20	-0.33
Free State	8%	11%	0.05	-0.25
Gauteng	2%	4%	-0.11*	-0.48***
KwaZulu-Natal	3%	7%	-0.02	-0.63***
Limpopo	3%	7%	0.03	-0.36*
Mpumalanga	2%	8%	-0.06	-0.40
North West	4%	10%	-0.39*	-0.62***
Northern Cape	7%	14%	0.00	0.08
Western Cape	1%	3%	-0.03	-0.16
Total	**3%**	**7%**	**0.08**	**-0.46*** **
Sparkling wine/Champagne				
Eastern Cape	4%	7%	0.01	-0.34
Free State	8%	8%	0.47*	0.19
Gauteng	8%	7%	0.51**	0.28
KwaZulu-Natal	4%	5%	0.03	0.03
Limpopo	5%	7%	0.49**	0.41
Mpumalanga	5%	8%	0.21	-0.03
North West	8%	10%	0.43*	0.35
Northern Cape	8%	9%	0.54*	0.21
Western Cape	5%	6%	0.30**	0.09
Total	**8%**	**7%**	**0.36****	**0.15**
Whisky				
Eastern Cape	3%	11%	0.01	0.50*
Free State	10%	23%	0.78***	1.48***
Gauteng	8%	23%	0.45***	1.11***
KwaZulu-Natal	4%	15%	0.26*	0.78***
Limpopo	4%	13%	0.31**	0.93*
Mpumalanga	5%	17%	0.25*	0.86**
North West	9%	18%	0.59***	1.12***
Northern Cape	7%	15%	0.56**	0.51*
Western Cape	7%	17%	0.19**	0.06
Total	**7%**	**7%**	**0.4*****	**-0.84*****
White spirits				
Eastern Cape	3%	7%	-0.03	-0.83**
Free State	5%	10%	0.20	-0.01
Gauteng	5%	8%	0.02	-0.34*
KwaZulu-Natal	2%	9%	-0.01	-1.05***
Limpopo	4%	8%	0.22	0.39*
Mpumalanga	3%	6%	0.01	-0.48
North West	6%	8%	-0.02	-1.04*
Northern Cape	4%	6%	0.16	-0.56
Western Cape	4%	7%	-0.08	-0.39*
Total	**4%**	**8%**	**0.07**	**-0.49****

Source: *AMPS (various years)*

TABLE 5: THE PREVALENCE OF HEAVY DRINKING FOR EACH PROVINCE

	AVERAGE PREVALENCE 2010-2012		AVERAGE ANNUAL CHANGE IN PREVALENCE PERCENTAGE 2001-2012	
	Female	Male	Female	Male
Beer				
Eastern Cape	1%	10%	-0.08	-0.11
Free State	4%	18%	0.06	-0.19
Gauteng	3%	21%	-0.06	0.35
KwaZulu-Natal	1%	9%	-0.02	-0.36**
Limpopo	2%	16%	0.06	0.37*
Mpumalanga	2%	14%	-0.04	0.03
North West	2%	17%	-0.13	0.03
Northern Cape	3%	18%	0.17	0.59*
Western Cape	3%	15%	0.06	-0.12
Total	**2%**	**15%**	**0.01**	**-0.03**
Brandy				
Eastern Cape	1%	7%	-0.08	-0.36
Free State	2%	9%	-0.01	-0.13
Gauteng	2%	7%	0.03	-0.23*
KwaZulu-Natal	1%	5%	0.00	-0.40**
Limpopo	1%	4%	0.02	0.08
Mpumalanga	1%	5%	0.02	-0.34*
North West	1%	5%	-0.02	-0.08
Northern Cape	3%	7%	0.26*	-0.19
Western Cape	3%	9%	0.02	-0.33**
Total	**1%**	**6%**	**-0.02**	**-0.27*** **
Flavoured alcoholic beverages				
Eastern Cape	5%	7%	0.45***	0.39**
Free State	14%	13%	1.16***	0.78**
Gauteng	12%	12%	0.88***	0.77**
KwaZulu-Natal	5%	8%	0.30**	0.41*
Limpopo	11%	13%	1.07***	1.07***
Mpumalanga	8%	12%	0.48*	0.64*
North West	12%	11%	0.83**	0.71*
Northern Cape	11%	10%	1.10***	0.76*
Western Cape	7%	7%	0.44**	0.34
Total	**9%**	**10%**	**0.75*** **	**0.64****
Fortified wine				
Eastern Cape	0%	2%	0.00	-0.02
Free State	1%	2%	-0.01	0.06
Gauteng	1%	1%	-0.07	0.00
KwaZulu-Natal	0%	1%	0.00	0.00
Limpopo	1%	1%	0.00	0.01
Mpumalanga	1%	1%	0.00	0.00
North West	1%	0%	-0.01	0.01
Northern Cape	1%	3%	0.05	0.09
Western Cape	1%	2%	0.02	-0.04
Total	**1%**	**1%**	**0.00**	**0.00**

	AVERAGE PREVALENCE 2010-2012		AVERAGE ANNUAL CHANGE IN PREVALENCE PERCENTAGE 2001-2012	
	Female	Male	Female	Male
Liqueur				
Eastern Cape	1%	2%	0.00	-0.04
Free State	3%	5%	0.15*	0.25
Gauteng	4%	4%	0.21**	0.10
KwaZulu-Natal	2%	3%	0.06	0.10
Limpopo	2%	4%	0.14	0.23*
Mpumalanga	2%	4%	0.09	0.08
North West	4%	5%	0.32**	0.19
Northern Cape	2%	3%	0.09	0.05
Western Cape	2%	4%	0.07	0.09
Total	**3%**	**3%**	**0.14*** **	**0.05**
Natural table wine (boxes)				
Eastern Cape	1%	2%	0.00	-0.08
Free State	2%	4%	0.06	0.08
Gauteng	3%	3%	-0.09*	-0.06
KwaZulu-Natal	1%	2%	-0.01	-0.1*
Limpopo	2%	2%	0.07	0.00
Mpumalanga	1%	2%	-0.05	-0.01
North West	3%	2%	-0.05	-0.01
Northern Cape	2%	5%	0.16	0.09
Western Cape	2%	3%	-0.11	-0.24*
Total	**2%**	**2%**	**-0.01**	**-0.02**
Natural table wine (corked)				
Eastern Cape	1%	3%	0.00	0.12*
Free State	3%	4%	0.11	0.13
Gauteng	3%	3%	0.13*	0.05
KwaZulu-Natal	1%	2%	0.00	0.06
Limpopo	2%	2%	0.08	0.11*
Mpumalanga	2%	2%	0.08*	-0.01
North West	3%	2%	0.12*	0.02
Northern Cape	2%	4%	0.15	0.24
Western Cape	3%	4%	0.00	-0.11
Total	**2%**	**2%**	**0.15****	**0.02**
Rum				
Eastern Cape	0%	1%	0.00	-0.05
Free State	1%	2%	0.00	0.05
Gauteng	1%	1%	0.00	-0.06*
KwaZulu-Natal	0%	1%	-0.06*	0.00
Limpopo	0%	0%	0.00	0.03
Mpumalanga	1%	1%	0.00	-0.02
North West	0%	1%	0.00	-0.04
Northern Cape	1%	1%	0.07	0.01
Western Cape	1%	2%	0.00	0.01
Total	**1%**	**1%**	**-0.03**	**0.00**

	AVERAGE PREVALENCE 2010-2012		AVERAGE ANNUAL CHANGE IN PREVALENCE PERCENTAGE 2001-2012	
	Female	**Male**	**Female**	**Male**
Sorghum beer				
Eastern Cape	1%	4%	-0.06	-0.14
Free State	2%	3%	-0.09	-0.44**
Gauteng	0%	1%	0.00	-0.23***
KwaZulu-Natal	1%	2%	0.00	-0.30***
Limpopo	1%	2%	-0.04	-0.37***
Mpumalanga	1%	2%	0.00	-0.38**
North West	1%	4%	-0.16*	-0.41***
Northern Cape	1%	4%	0.00	0.01
Western Cape	0%	1%	0.01	0.00
Total	**1%**	**2%**	**0.00**	**-0.29*** **
Sparkling wine/Champagne				
Eastern Cape	1%	2%	0.00	-0.16*
Free State	2%	2%	0.12	0.08
Gauteng	2%	2%	0.23*	0.20*
KwaZulu-Natal	1%	2%	0.03	-0.04
Limpopo	2%	3%	0.16	0.19*
Mpumalanga	1%	2%	0.20**	0.06
North West	2%	3%	0.13*	0.05
Northern Cape	1%	2%	0.07	0.00
Western Cape	1%	1%	0.10**	0.12
Total	**2%**	**2%**	**0.14***	**0.07**
Whisky				
Eastern Cape	1%	4%	0.00	0.17
Free State	3%	9%	0.20*	0.48**
Gauteng	3%	8%	0.14*	0.41***
KwaZulu-Natal	1%	6%	0.03	0.25***
Limpopo	1%	4%	0.05	0.29**
Mpumalanga	2%	5%	0.13	0.3**
North West	2%	6%	0.14	0.38**
Northern Cape	2%	5%	0.18*	0.20*
Western Cape	2%	8%	0.09*	0.07
Total	**2%**	**6%**	**0.09****	**0.25*** **
White spirits				
Eastern Cape	1%	4%	0.04	-0.11
Free State	2%	5%	0.19*	-0.01
Gauteng	2%	3%	-0.05	-0.14
KwaZulu-Natal	1%	4%	-0.02	-0.58***
Limpopo	2%	4%	0.13*	0.21*
Mpumalanga	1%	3%	-0.04	-0.17
North West	2%	2%	-0.05	-0.36
Northern Cape	2%	3%	0.11	0.04
Western Cape	2%	4%	-0.05	-0.19
Total	**2%**	**4%**	**-0.01**	**-0.18**

Source: *AMPS (various years)*

2.1.2 GENDER AND RACE

Alcohol usage is clearly differentiated by gender and race. Among women, Coloured females dominate beer drinking (16%) and their prevalence has increased with a statistically significant trend of 0.42% per year from 2001-2012. White females have the second highest prevalence for beer (11%) but their trend is decreasing over time. White males have the highest drinking (36%) and heavy drinking prevalence (17%) for beer, followed closely by Coloureds (35%, 15%) and Blacks (34%, 15%) respectively. As expected, sorghum beer prevalence and heavy prevalence is dominated by Blacks in both gender groups; however, there is a significant decrease in the prevalence of sorghum beer consumption by males (-0.57% per year), but not by females. There is also a significant decrease in heavy sorghum beer consumption by males (-0.31% per year) but again not by females. As incomes rise, the evidence suggests that people substitute from sorghum beer to regular beer.

The spirits categories with the highest prevalence rates are brandy and whisky which are dominated by Whites in the male (20% and 19%) and female (9% and 8%) categories. This having been said, there is a significant increasing prevalence in Black whisky drinkers with yearly increases of 0.43% for women and 1.08% for men. This trend, together with modest decreases in the prevalence of whisky consumption among whites (-0.22% for males and -0.14% for females, per year), has changed the racial composition of whisky consumption quite sharply over the past decade. This change is ascribed to the rise of the emerging black middle class and of whisky being portrayed as a fashionable drink on South African television.

The FABs have experienced rapidly increasing prevalence levels for all races and genders. The rapid increase in the popularity of FABs among large proportions of the population is presumably due to the easy-drinking nature of the product and the fact that it is not an acquired taste, like some other alcohol categories. Liqueur use shows prevalence rates above 9%, except in the Indian population, with increasing trends, of which some are significant, in all racial and gender groups.

The prevalence of wine consumption (both boxed and corked) is highest among Whites, followed by Coloureds, Blacks and Indians (in that order). The lower prevalence among Indians could possibly be explained by the fact that the Hindu religion discourages the consumption of alcohol and Islam forbids it, although there is some debate about consuming soy sauce, vanilla extract and dishes where the alcohol would be cooked out of the food (Quran 5:9). Annual prevalence trends are positive for all racial groups other than for Whites, where it is decreasing, especially for boxed wine. This indicates a decrease in the race gap in this category. Sparkling wine is something of an exception for the Indian population, with Indian male prevalence being equal to that of Coloured males. Prevalence trends for sparkling wine/Champagne are generally positive, with those of the Indian and White population being significantly so. This may be owing to the use of Champagne as a status symbol, as it is often associated with prestige and luxury.

TABLE 6: THE PREVALENCE OF DRINKING IN THE PAST WEEK FOR EACH RACE

	AVERAGE PREVALENCE 2010-2012		AVERAGE ANNUAL CHANGE IN PREVALENCE PERCENTAGE 2001-2012	
	Female	**Male**	**Female**	**Male**
Beer				
Black	8%	34%	0.05	0.09
Coloured	16%	35%	0.42**	0.24
Indian	3%	21%	0.02	-0.07
White	11%	36%	-0.27**	-0.87***
Total	**9%**	**34%**	**0.01**	**-0.05**

	AVERAGE PREVALENCE 2010-2012		AVERAGE ANNUAL CHANGE IN PREVALENCE PERCENTAGE 2001-2012	
	Female	Male	Female	Male
Brandy				
Black	6%	17%	0.21***	-0.26
Coloured	7%	14%	0.17	-0.55*
Indian	2%	10%	0.09	-0.52*
White	9%	20%	0.06	-0.35*
Total	**6%**	**17%**	**0.13***	**-0.33****
Flavoured alcoholic beverages				
Black	20%	25%	1.40***	1.32***
Coloured	19%	20%	1.15***	0.92*
Indian	10%	16%	0.51**	0.69**
White	20%	18%	0.76*	0.65
Total	**21%**	**23%**	**1.34*****	**1.22****
Fortified wine				
Black	4%	5%	0.12	0.12**
Coloured	7%	9%	0.51***	0.06
Indian	3%	3%	0.07	0.21*
White	6%	6%	-0.03	-0.17
Total	**5%**	**5%**	**0.08**	**0.02**
Liqueur				
Black	9%	12%	0.54***	0.50**
Coloured	10%	10%	0.64***	0.36
Indian	4%	6%	0.28***	0.13
White	11%	11%	0.15	0.06
Total	**9%**	**12%**	**0.50*****	**0.40****
Natural table wine (boxes)				
Black	7%	8%	0.26***	0.16**
Coloured	9%	12%	0.48***	0.10
Indian	2%	3%	0.14*	0.06
White	13%	11%	-0.63*	-0.77**
Total	**7%**	**9%**	**0.15****	**0.03**
Natural table wine (corked bottles)				
Black	8%	8%	0.37**	0.29**
Coloured	8%	11%	0.52***	0.41
Indian	5%	5%	0.34*	0.24
White	18%	15%	-0.08	-0.37
Total	**9%**	**10%**	**0.34****	**0.26***
Rum				
Black	3%	5%	0.16***	0.12
Coloured	5%	8%	0.29**	0.08
Indian	1%	3%	0.00	-0.05
White	4%	7%	0.10	-0.08
Total	**3%**	**6%**	**0.14*****	**0.12***
Sorghum beer				
Black	4%	9%	-0.04	-0.57***
Coloured	2%	4%	0.01	-0.10
Indian	0%	1%	0.00	-0.10*
White	0%	0%	0.00	-0.02
Total	**3%**	**7%**	**-0.08**	**-0.46*****

	AVERAGE PREVALENCE 2010-2012		AVERAGE ANNUAL CHANGE IN PREVALENCE PERCENTAGE 2001-2012	
	Female	Male	Female	Male
Sparkling wine/Champagne				
Black	7%	7%	0.29	0.04
Coloured	7%	5%	0.35*	-0.07
Indian	4%	5%	0.24**	0.22*
White	11%	9%	0.52***	0.32*
Total	**8%**	**7%**	**0.36****	**0.15**
Whisky				
Black	6%	17%	0.43***	1.08***
Coloured	7%	15%	0.42***	0.20
Indian	2%	14%	0.13	0.55**
White	8%	19%	-0.14*	-0.22
Total	**7%**	**17%**	**0.40*****	**0.84*****
White spirits				
Black	4%	9%	0.04	-0.44**
Coloured	4%	5%	0.02	-0.55***
Indian	1%	5%	-0.06	-0.78***
White	5%	6%	-0.23*	-0.44**
Total	**4%**	**8%**	**0.07**	**-0.49****

Source: *AMPS (various years)*

TABLE 7: THE PREVALENCE OF HEAVY DRINKING FOR EACH RACE

	AVERAGE PREVALENCE 2010-2012		AVERAGE ANNUAL CHANGE IN PREVALENCE PERCENTAGE 2001-2012	
	Female	Male	Female	Male
Beer				
Black	2%	15%	-0.01	0.09
Coloured	5%	15%	0.22**	0.12
Indian	0%	8%	0.00	0.06
White	3%	17%	-0.02	-0.34*
Total	**2%**	**15%**	**-0.01**	**0.03**
Brandy				
Black	1%	5%	0.00	-0.28***
Coloured	2%	5%	0.03	-0.33*
Indian	1%	5%	0.00	-0.41***
White	3%	10%	-0.03	-0.45***
Total	**1%**	**6%**	**-0.02**	**-0.27*****
Flavoured alcoholic beverages				
Black	9%	11%	0.74***	0.69**
Coloured	8%	8%	0.63***	0.44*
Indian	3%	7%	0.20**	0.37**
White	8%	8%	0.51**	0.51*
Total	**9%**	**10%**	**0.75*****	**0.64****
Fortified wine				
Black	1%	1%	0.00	0.00
Coloured	2%	2%	0.08	-0.09
Indian	0%	0%	0.00	0.00
White	1%	2%	0.04	-0.04
Total	**1%**	**1%**	**0.00**	**0.00**

	AVERAGE PREVALENCE 2010-2012		AVERAGE ANNUAL CHANGE IN PREVALENCE PERCENTAGE 2001-2012	
	Female	Male	Female	Male
Liqueur				
Black	2%	3%	0.14**	0.05
Coloured	3%	3%	0.16*	0.03
Indian	1%	2%	0.00	0.05
White	3%	4%	0.08	0.06
Total	**3%**	**3%**	**0.14*** **	**0.05**
Natural table wine (boxes)				
Black	1%	1%	0.00	0.02
Coloured	2%	4%	0.16**	-0.10
Indian	0%	1%	-0.10	0.00
White	4%	4%	-0.36***	-0.39***
Total	**2%**	**2%**	**-0.01**	**-0.02**
Natural table wine (corked bottles)				
Black	2%	2%	0.07*	0.09*
Coloured	2%	4%	0.13*	0.13
Indian	1%	1%	0.00	0.00
White	6%	6%	0.06	-0.08
Total	**2%**	**2%**	**0.15****	**0.02**
Rum				
Black	0%	1%	-0.13	0.00
Coloured	1%	2%	0.00	-0.06
Indian	0%	1%	0.00	-0.08
White	1%	2%	0.00	-0.17**
Total	**1%**	**1%**	**-0.03**	**0.00**
Sorghum beer				
Black	1%	3%	-0.06	-0.31***
Coloured	0%	1%	0.00	0.02
Indian	0%	0%	0.00	0.00
White	0%	0%	0.00	0.00
Total	**1%**	**2%**	**0.00**	**-0.29*** **
Sparkling wine/Champagne				
Black	2%	2%	0.10*	0.07
Coloured	1%	2%	0.08*	-0.02
Indian	1%	2%	0.24*	0.14
White	3%	3%	0.22**	0.23**
Total	**2%**	**2%**	**0.14***	**0.07**
Whisky				
Black	2%	6%	0.12*	0.40***
Coloured	2%	7%	0.14**	0.10
Indian	1%	8%	0.00	0.29**
White	3%	9%	-0.09*	-0.36***
Total	**2%**	**6%**	**0.09****	**0.25*** **
White spirits				
Black	2%	4%	0.09	-0.15
Coloured	2%	2%	0.07	-0.27**
Indian	0%	3%	-0.27**	-0.51***
White	2%	3%	-0.05	-0.30**
Total	**2%**	**4%**	**-0.01**	**-0.18**

Source: *AMPS (various years)*

2.1.3 AGE AND LIVING STANDARD MEASURE (LSM)

The Living Standard Measure (LSM) is based on access to services and durables, and geographic indicators as determinants of standard of living (see Appendix 2 for list and weights). This chapter splits the 10 LSM levels into 5 different categories, with broadly similar population proportions (see Appendix 2); these LSM groups are LSM 1-4, LSM 5, LSM 6, LSM 7-8 and LSM 9-10. LSM 1-4 indicates very low standards of living and LSM 9-10 indicates very high standards of living.

The LSMs with the highest prevalence for beer are LSM 5 and LSM 6, that is, for the proportion of the population with an "average standard of living." There are significant decreasing trends for beer prevalence in LSM 9-10, i.e. those with a "high standard of living" for all age groups (between 0.37% and 1.16% per year). For heavy beer drinking, LSM 6, 7-8 and 9-10 show the highest heavy prevalence rates (8-13%) for ages above 18. Prevalence of use and heavy beer use are highest among 25-34 year olds, followed by 35-49 year olds for all LSMs. The highest prevalence and heavy prevalence for sorghum beer can be found in the 50+ age category, followed by 35-49 year olds, and in the lower LSMs (1-4, 5 and 6).

The highest prevalence among spirits can be seen in LSM 5 and 6 for brandy (between 9% and 17%) and white spirits (between 5% and 10%) for ages above 18, and in LSM 6, 7-8 and 9-10 for whisky (between 9% and 18%) for ages above 18. Heavy drinking prevalence is also highest in LSM 9-10 for brandy and whisky (8%) and in LSM 5 and LSM 6 for white spirits (5%-9%).The highest prevalences for all spirits are found in the 25-34 and 18-24 age categories. The trends for whisky drinking show that for the lower age groups (from 18 years and above) in the lower LSM categories the trends are positive and significant (between 0.41% and 1.06% overall, and between 0.16% and 0.43% for heavy prevalence), while for those in the highest age group (50+) and the highest LSM category (LSM 9-10) the trends are declining, narrowing the LSM and age gap in drinking prevalence and heavy drinking for whisky over time.

Overall, the highest prevalence rates can be found for FABs, reaching 33% in LSM 5 (age category 25-34) and 16% for heavy prevalence in the same category. It also has generally positive trends from 2001-2012, especially for prevalence in the 25-34 age category, increasing annually at a significant rate of 1.66% per year in LSM 5. These high prevalence rates and positive trends can also be seen for liqueur, with prevalence reaching 16% in LSM 6 (25-34yrs) and heavy prevalence peaking at 5% in LSM 5 and LSM 7-8 (25-34yrs). Trends in prevalence are generally positive, with those for the 25-34 and 35-49 age categories being significantly so, except for LSM 9-10.

The prevalence of use of fortified wine and boxed wine is broadly similar across LSMs 6 through 10. Lower LSMs have lower prevalence. Older people (35-49 but especially 50+) in LSM 9-10 have higher prevalence of use of boxed wine. The prevalence of use of (typically more expensive) bottled wine is higher among LSM 9-10, but the prevalence of use of this group has been decreasing across all age groups, but especially the older age groups. The increased prevalence of boxed wine among LSMs 5-8, together with the decreased prevalence among LSM 9-10 implies that prevalence is converging. Prevalence rates for sparkling wine/Champagne are highest in LSM 7-8 and 9-10 (25-34 and 35-49 yrs). Those with higher living standards consume more sparkling wine or Champagne, indicating that it may be used as a status symbol. The highest heavy prevalence for wine (corked, boxed and fortified) is in LSM 9-10 (50+yrs), but with boxed wine this trend is generally declining.

The most significant age category is that of 15-17 year olds as this group of people are below the legal drinking age in South Africa of 18 years. The highest prevalence for this age group is found for FABs with up to 19% prevalence in LSM 5 and LSM 6. The second highest underage prevalence is found for liqueur, reaching 11% prevalence in LSM 6 and the third highest prevalence is found for beer, reaching 10% in LSM 6. For the 15-17 age group, heavy prevalence is highest for FABs, for which it reaches 9% in LSM 6 followed by the categories of liqueur, whisky, beer and brandy where it reaches 3% in LSM 6.

TABLE 8: THE PREVALENCE OF DRINKING IN THE PAST WEEK FOR DIFFERENT AGES AND LIVING STANDARD MEASURES (LSM)

	AVERAGE PREVALENCE 2010-2012						AVERAGE ANNUAL CHANGE IN PREVALENCE PERCENTAGE 2001-2012					
	15-17	18-24	25-34	35-49	50+	TOTAL	15-17	18-23	25-33	35-49	50+	TOTAL
Beer												
LSM 1-4	8%	16%	23%	23%	15%	18%	-0.14	0.07	0.21	-0.14	-0.50*	-0.14
LSM 5	9%	21%	28%	24%	19%	22%	0.32	0.44*	0.31	-0.22	0.09	0.08
LSM 6	10%	22%	26%	26%	18%	23%	-0.03	0.11	0.08	0.07	0.21	0.05
LSM 7-8	6%	23%	26%	24%	17%	21%	-0.36	-0.25	-0.24	-0.02	0.07	-0.14
LSM 9-10	8%	20%	25%	23%	19%	20%	-1.16***	-1.13***	-0.45*	-0.50**	-0.37**	-0.6***
Brandy												
LSM 1-4	5%	11%	13%	11%	6%	10%	-0.13	0.09	0.15	-0.18	-0.21	-0.09
LSM 5	8%	14%	17%	12%	9%	13%	0.02	0.09	0.03	-0.15	-0.09	-0.07
LSM 6	8%	15%	15%	13%	8%	12%	-0.03	-0.08	-0.08	0	-0.04	-0.09
LSM 7-8	4%	14%	13%	11%	8%	11%	-0.43*	-0.2	-0.28	-0.32**	-0.22**	-0.29**
LSM 9-10	6%	13%	12%	11%	10%	11%	-0.52**	-0.45*	-0.36	-0.26*	-0.42***	-0.37**
Flavoured alcoholic beverages												
LSM 1-4	15%	24%	24%	14%	7%	17%	0.62*	1.26***	1.26***	0.64**	0.27*	0.71**
LSM 5	19%	33%	33%	23%	12%	25%	0.62	1.59**	1.66**	1.09**	0.75**	1.12**
LSM 6	19%	34%	32%	25%	14%	26%	0.72	1.74**	1.5**	1.36***	0.76***	1.17**
LSM 7-8	15%	32%	29%	22%	12%	22%	0.33	1.33*	1.29**	1.03**	0.75***	0.93**
LSM 9-10	13%	30%	28%	20%	11%	20%	-0.66**	0.72	0.83	0.63*	0.45*	0.48
Fortified wine												
LSM 1-4	3%	3%	3%	4%	3%	3%	-0.04	-0.04	-0.07	0.05	0.1	0.01
LSM 5	4%	6%	6%	6%	4%	5%	-0.03	-0.04	0.17	0.14	0.08	0.09
LSM 6	3%	4%	6%	6%	6%	5%	-0.22	-0.12	0.07	0.34***	0.22*	0.12
LSM 7-8	2%	5%	7%	6%	6%	6%	-0.35	-0.05	0.23*	0.17	0.11	0.09
LSM 9-10	3%	4%	6%	5%	7%	6%	-0.04	-0.08	-0.07	-0.12*	-0.23*	-0.14*
Liqueur												
LSM 1-4	6%	9%	11%	7%	4%	8%	0.22	0.35**	0.46**	0.30**	0.13	0.28**
LSM 5	10%	16%	16%	11%	6%	12%	0.5*	0.74***	0.79**	0.62**	0.35	0.61**
LSM 6	11%	15%	16%	13%	7%	13%	0.36	0.64	0.74**	0.77***	0.50***	0.64***
LSM 7-8	5%	15%	14%	11%	7%	11%	0	0.31	0.71***	0.45**	0.18	0.37*
LSM 9-10	5%	12%	12%	10%	8%	10%	-0.43***	-0.31	0.12	0.07	-0.12	-0.05
Natural table wine (boxes)												
LSM 1-4	5%	7%	9%	7%	4%	6%	0.03	0.09	0.29**	0.16	0.06	0.12*
LSM 5	6%	9%	11%	8%	6%	9%	0.15	0.16	0.38*	0.3**	0.03	0.22***
LSM 6	6%	9%	10%	9%	6%	8%	0.2	0.13	0.37***	0.42***	0.01	0.25***
LSM 7-8	3%	10%	9%	9%	7%	8%	-0.06	0.12	0.2	0.11	-0.64***	-0.08
LSM 9-10	4%	9%	10%	10%	13%	10%	-0.17	-0.22	-0.51*	-0.8**	-1.13**	-0.75**
Natural table wine (corked bottles)												
LSM 1-4	4%	7%	8%	7%	4%	6%	0.02	0.16	0.37*	0.27*	0.11	0.2*
LSM 5	7%	12%	11%	9%	6%	9%	0.22	0.46*	0.53**	0.4**	0.24*	0.4**
LSM 6	8%	9%	10%	9%	7%	9%	0.46*	0.4***	0.48***	0.44**	0.36***	0.42***
LSM 7-8	4%	10%	11%	10%	9%	10%	0.2	0.25	0.24	0.36	-0.11	0.16
LSM 9-10	4%	11%	13%	15%	18%	14%	-0.22	-0.21	-0.77*	-0.58*	-0.67*	-0.63*
Rum												
LSM 1-4	3%	3%	5%	3%	1%	3%	-0.04	-0.06	0.26***	0.06	-0.05	0.03
LSM 5	5%	7%	8%	5%	2%	6%	0.15	0.12	0.33*	0.14	-0.02	0.15*
LSM 6	4%	6%	6%	5%	4%	5%	-0.17	0.11	0.2	0.25**	0.27***	0.17*
LSM 7-8	3%	7%	7%	5%	3%	5%	-0.06	0	0.32**	0.07	0.12	0.12
LSM 9-10	3%	9%	6%	4%	3%	5%	-0.48**	-0.25	0.06	-0.04	0.1	0

	AVERAGE PREVALENCE 2010-2012						AVERAGE ANNUAL CHANGE IN PREVALENCE PERCENTAGE 2001-2012					
	15-17	18-24	25-34	35-49	50+	TOTAL	15-17	18-23	25-33	35-49	50+	TOTAL
Sorghum beer												
LSM 1-4	5%	6%	8%	12%	13%	9%	0.08	0.01	-0.07	-0.1	-0.33	-0.09
LSM 5	5%	5%	6%	7%	10%	7%	0.25	0.11	0.05	-0.15	0.14	0.05
LSM 6	2%	3%	4%	5%	7%	4%	-0.19	-0.04	0.04	-0.02	0.23	0.04
LSM 7-8	1%	2%	2%	2%	2%	2%	-0.02	-0.06	-0.02	0.03	0.04	0
LSM 9-10	0%	1%	1%	1%	0%	1%	-0.05	-0.14	-0.02	-0.02	-0.01	-0.03
Sparkling wine/Champagne												
LSM 1-4	5%	4%	6%	4%	3%	4%	0.16	-0.13	0.12	0.05	0.01	0.02
LSM 5	7%	9%	10%	7%	4%	8%	0.17	0.02	0.06	0.16	-0.01	0.05
LSM 6	6%	9%	11%	9%	6%	9%	0.21	0.09	0.33	0.28	0.34*	0.24
LSM 7-8	4%	12%	11%	10%	7%	9%	-0.09	0.26	0.45***	0.38*	0.29**	0.33**
LSM 9-10	4%	12%	12%	11%	9%	10%	-0.36*	0.31	0.54**	0.48***	0.42**	0.4**
Whisky												
LSM 1-4	5%	8%	10%	7%	3%	7%	0.26	0.47***	0.73***	0.26	0.01	0.34**
LSM 5	8%	17%	15%	10%	5%	12%	0.31	1.16***	1.01***	0.46**	0.08	0.67***
LSM 6	8%	14%	18%	15%	9%	14%	0.32	0.86***	1.06***	1.03***	0.48**	0.81***
LSM 7-8	5%	16%	16%	15%	10%	14%	0.3	0.64**	0.73***	0.58***	-0.21	0.4***
LSM 9-10	3%	12%	16%	17%	16%	15%	-0.17	0.1	0.34*	0.27*	-0.37***	0.01
White spirits												
LSM 1-4	4%	7%	7%	7%	4%	6%	0.04	-0.24	-0.15	-0.2	-0.23	-0.2*
LSM 5	5%	10%	8%	7%	5%	8%	-0.48*	0.07	-0.16	-0.14	-0.34**	-0.16
LSM 6	6%	9%	7%	6%	5%	7%	-0.16	-0.01	-0.24	-0.06	-0.01	-0.1
LSM 7-8	3%	8%	6%	5%	4%	5%	-0.09	-0.19	-0.05	-0.12	-0.16*	-0.14
LSM 9-10	4%	7%	5%	4%	4%	5%	-0.63	-0.76**	-0.3	-0.22	-0.33**	-0.33*

Source: *AMPS (various years)*

TABLE 9: THE PREVALENCE OF HEAVY DRINKING FOR DIFFERENT AGES AND LIVING STANDARD MEASURES (LSM)

	AVERAGE PREVALENCE 2010-2012						AVERAGE ANNUAL CHANGE IN PREVALENCE PERCENTAGE 2001-2012					
	15-17	18-24	25-34	35-49	50+	TOTAL	15-17	18-23	25-33	35-49	50+	TOTAL
Beer												
LSM 1-4	1%	6%	9%	9%	4%	6%	-0.16	0.05	-0.03	0.01	-0.18	-0.08
LSM 5	2%	6%	12%	9%	7%	8%	-0.05	-0.14	0.14	-0.36	-0.04	-0.14
LSM 6	3%	7%	12%	10%	7%	9%	0.05	-0.18	-0.05	-0.08	0.1	-0.1
LSM 7-8	2%	9%	12%	11%	7%	9%	-0.12	-0.13	-0.09	0.17	-0.03	-0.04
LSM 9-10	3%	8%	13%	11%	9%	9%	-0.1	-0.5***	-0.02	0	0.08	-0.07
Brandy												
LSM 1-4	1%	3%	3%	4%	3%	3%	-0.05	0.01	-0.1	-0.09	-0.01	-0.06**
LSM 5	2%	3%	4%	4%	3%	3%	-0.02	-0.16	-0.34**	-0.20*	-0.13**	-0.23**
LSM 6	3%	4%	4%	4%	2%	4%	0.02	-0.2	-0.37**	-0.09	-0.09	-0.2*
LSM 7-8	2%	5%	5%	4%	3%	4%	-0.24	-0.29*	-0.49***	-0.32**	-0.23***	-0.34***
LSM 9-10	2%	5%	6%	5%	4%	5%	-0.18**	-0.39**	-0.35**	-0.24*	-0.32***	-0.3***
Flavoured alcoholic beverages												
LSM 1-4	4%	9%	9%	6%	2%	6%	0.21	0.62**	0.35	0.23	0.14	0.25
LSM 5	5%	14%	16%	10%	4%	11%	0.11	0.73*	0.81*	0.49	0.22	0.43
LSM 6	9%	15%	15%	11%	5%	12%	0.61	0.86*	0.76*	0.70***	0.30***	0.55*
LSM 7-8	6%	15%	15%	10%	4%	11%	0.24	1.00**	0.88**	0.65**	0.26**	0.56*
LSM 9-10	7%	15%	14%	9%	4%	9%	0.22	0.68	0.80**	0.47**	0.30**	0.45*

	AVERAGE PREVALENCE 2010-2012						AVERAGE ANNUAL CHANGE IN PREVALENCE PERCENTAGE 2001-2012					
	15-17	18-24	25-34	35-49	50+	TOTAL	15-17	18-23	25-33	35-49	50+	TOTAL
Fortified wine												
LSM 1-4	1%	1%	1%	1%	1%	1%	0.03	-0.01	-0.03	0.04	0.03	0.01
LSM 5	0%	1%	1%	2%	0%	1%	-0.09	-0.01	-0.02	0.11*	-0.04	0
LSM 6	1%	1%	1%	1%	1%	1%	-0.03	-0.08*	-0.04	-0.03	-0.03	-0.04*
LSM 7-8	0%	1%	2%	1%	1%	1%	-0.12	-0.02	0.06	-0.03	0.01	-0.01
LSM 9-10	0%	1%	1%	1%	2%	1%	-0.10*	-0.07	-0.04	-0.03	-0.12**	-0.07***
Liqueur												
LSM 1-4	2%	2%	3%	2%	1%	2%	0.1	0.03	0.03	0.09	0.02	0.04
LSM 5	1%	4%	5%	3%	1%	3%	-0.01	0.14	0.17	0.17*	0.04	0.11
LSM 6	3%	3%	4%	4%	1%	3%	0.07	0.02	0.03	0.16*	0.05	0.06
LSM 7-8	1%	5%	5%	3%	2%	4%	0.03	0.08	0.21*	0.1	0.09	0.11
LSM 9-10	2%	4%	4%	3%	2%	3%	-0.15	-0.22	0.16	0.03	-0.04	-0.01
Natural table wine (boxes)												
LSM 1-4	1%	1%	2%	2%	1%	2%	0.09**	-0.02	0.05	0.12	0.06	0.05*
LSM 5	1%	1%	2%	2%	1%	2%	-0.02	-0.05	0.02	0.10*	-0.02	0.01
LSM 6	2%	2%	2%	2%	1%	2%	0.14	-0.02	0.01	0.06	-0.06	0.01
LSM 7-8	0%	2%	2%	2%	2%	2%	-0.01	-0.04	-0.01	-0.04	-0.38***	-0.12**
LSM 9-10	1%	2%	2%	3%	5%	3%	-0.09	-0.02	-0.25**	-0.50***	-0.69***	-0.44***
Natural table wine (corked bottles)												
LSM 1-4	1%	1%	1%	2%	1%	1%	0.03	0.04	0.04	0.16**	0.06	0.07**
LSM 5	1%	1%	2%	2%	2%	2%	0.05	-0.06	0.11*	0.16**	0.09	0.07*
LSM 6	1%	2%	2%	2%	2%	2%	0.1	0.02	0.13**	0.06	0.09*	0.08**
LSM 7-8	1%	3%	2%	3%	3%	3%	0	0.03	0.02	0.1	0	0.03
LSM 9-10	1%	2%	3%	5%	7%	4%	-0.03	-0.07	-0.23	-0.31*	-0.3	-0.27*
Rum												
LSM 1-4	1%	0%	1%	1%	0%	0%	0.04	-0.05	0	0.04	0	0
LSM 5	0%	1%	1%	1%	0%	1%	0.02	-0.06	0	0.03	-0.05	-0.01
LSM 6	0%	1%	1%	1%	0%	1%	-0.17	-0.02	-0.01	-0.02	0.01	-0.02
LSM 7-8	0%	1%	1%	1%	1%	1%	-0.06	-0.14*	-0.03	-0.09	0.03	-0.06
LSM 9-10	0%	2%	1%	1%	1%	1%	-0.29**	-0.29***	-0.15*	-0.05	-0.03	-0.1***
Sorghum beer												
LSM 1-4	1%	1%	2%	5%	5%	3%	0.09*	-0.05	-0.14**	-0.11	-0.19	-0.09
LSM 5	1%	0%	1%	2%	4%	2%	0.01	-0.11**	-0.05	-0.11	-0.07	-0.07
LSM 6	0%	0%	1%	1%	2%	1%	-0.07	-0.07*	-0.06	-0.10*	0.01	-0.06
LSM 7-8	0%	0%	0%	0%	0%	0%	0.02	-0.06	-0.06*	-0.02	-0.02	-0.03*
LSM 9-10	0%	0%	0%	0%	0%	0%	0.12	-0.06*	-0.06*	-0.03	0.01	-0.03*
Sparkling wine/Champagne												
LSM 1-4	1%	1%	2%	2%	1%	1%	-0.01	0.02	0.07	0.09	0.04	1%
LSM 5	1%	2%	2%	3%	1%	2%	0.08	0.02	0.06	0.15*	-0.03	1%
LSM 6	1%	3%	3%	3%	2%	2%	0.12	0.13	0.13*	0.11	0.06	1%
LSM 7-8	1%	4%	4%	3%	2%	3%	-0.06	0.2	0.22*	0.20*	0.13*	1%
LSM 9-10	1%	4%	3%	3%	3%	3%	-0.04	0.25*	0.22**	0.22**	0.17**	1%
Whisky												
LSM 1-4	1%	3%	3%	2%	1%	2%	0.05	0.2**	0.24*	0.16*	0.04	0.14**
LSM 5	2%	5%	5%	3%	1%	3%	0.13	0.37***	0.28**	0.15**	0.04	0.2***
LSM 6	3%	4%	7%	6%	3%	5%	0.13	0.21**	0.43***	0.4**	0.04	0.27***
LSM 7-8	2%	5%	7%	6%	4%	5%	0.09	0.2*	0.29***	0.04	-0.21**	0.06
LSM 9-10	1%	4%	7%	8%	8%	6%	-0.08	-0.1	0	0.03	-0.27***	-0.11*
White spirits												
LSM 1-4	2%	3%	4%	3%	2%	3%	0.05	0	-0.02	-0.09	-0.14	-0.07
LSM 5	2%	4%	4%	3%	3%	3%	-0.08	0.05	-0.06	-0.06	-0.07	-0.03
LSM 6	2%	4%	3%	2%	2%	3%	-0.3*	-0.04	-0.06	-0.19**	-0.15	-0.13*
LSM 7-8	1%	3%	3%	2%	2%	2%	0.02	-0.07	-0.05	-0.09	-0.06	-0.08
LSM 9-10	1%	3%	2%	2%	2%	2%	-0.23*	-0.44**	-0.25*	-0.1	-0.18***	-0.2***

Source: *AMPS (various years)*

2.1.4 GEOGRAPHIC DISPERSION AND LIVING STANDARD MEASURE (LSM)

The highest prevalence of beer drinking (regular, sorghum) is found in LSM category 1-4 and in the Free State province (36%, 19%). High heavy drinking prevalence is also found in the Free State (14%, 6%) for LSM 1-4.

All spirits show the highest prevalence rates in LSM category 5, followed by LSM 1-4 and LSM 9-10; Geographically, the highest prevalence and heavy drinking prevalence are found in the Free State, followed by the Western Cape. Whisky is somewhat different, with the highest prevalence in LSM 9-10 in Mpumalanga (20%) followed by the North West and the Northern Cape (19% each), but the Free State still has high prevalence rates across all LSM groups for whisky.

The highest prevalence and heavy prevalence rates for FABs and liqueur across all LSMs are located in the Free State and in the Northern Cape, with high and significantly increasing trends reaching around 2.5 percentage point increases per year for FABs (LSM 6 in the Northern Cape). The living standard measure with the highest prevalence and heavy prevalence is LSM 6, although all LSMs are relatively high for both FABs and liqueur.

For natural table wine, the highest prevalence rates are found in the North West (boxed wine) and the Free State (corked wine), while sparkling wine or Champagne is highest in the Northern Cape. The highest prevalence for wines is in LSM 9-10. The prevalence of heavy wine drinking follows the same trend apart from a high of 11% in the Western Cape in LSM 1-4 (boxed wine).

TABLE 10: THE PREVALENCE OF DRINKING IN THE PAST WEEK FOR DIFFERENT LIVING STANDARD MEASURES (LSM) IN DIFFERENT PROVINCES

	AVERAGE PREVALENCE 2010-2012						AVERAGE ANNUAL CHANGE IN PREVALENCE PERCENTAGE 2001-2012					
LSM	**1-4**	**5**	**6**	**7-8**	**9-10**	**TOTAL**	**1-4**	**5**	**6**	**7-8**	**9-10**	**TOTAL**
Beer												
Eastern Cape	16%	21%	19%	20%	19%	17%	-0.24	0.19	-0.19	-0.43*	-1.32***	-0.32
Free State	36%	30%	25%	23%	20%	28%	0.82*	0.5	0.17	0.22	-0.59**	0.2
Gauteng	30%	29%	26%	23%	22%	24%	0.51	0.63*	0.06	-0.17	-0.34*	0.04
KwaZulu-Natal	12%	15%	15%	15%	18%	14%	-0.60***	-0.21	-0.18	-0.34*	-0.60***	-0.34**
Limpopo	17%	21%	20%	Z	22%	20%	0.33	0.27	0.29	-0.47	-0.48	0.66*
Mpumalanga	22%	19%	23%	19%	21%	21%	0.31	-0.12	0.59	-0.46*	-0.55	0.33
North West	28%	22%	26%	24%	23%	28%	0.34	-0.44	-0.02	-0.13	-0.45	0.58*
Northern Cape	32%	28%	29%	24%	21%	24%	0.81*	0.54	0.68	0.37	-0.43	-0.14
Western Cape	29%	26%	25%	24%	19%	22%	0.19	0.66	0.24	0.05	-0.90***	-0.24
Brandy												
Eastern Cape	10%	13%	10%	11%	10%	10%	-0.25	-0.1	-0.26	-0.60***	-0.68*	-0.33
Free State	21%	17%	14%	15%	13%	16%	0.69**	0.49*	0.03	-0.35	-0.66***	0.12
Gauteng	15%	16%	14%	11%	11%	13%	0.07	0.06	-0.11	-0.28	-0.39**	-0.11
KwaZulu-Natal	8%	10%	10%	8%	8%	8%	-0.19*	-0.33	-0.11	-0.22	-0.38**	-0.16*
Limpopo	7%	12%	9%	8%	7%	10%	0.25	0.14	0.27	-0.47	-0.45	0.43**
Mpumalanga	11%	13%	14%	11%	11%	12%	-0.21	-0.17	-0.35	-0.35	-0.19	-0.08
North West	12%	12%	12%	14%	12%	12%	0.13	-0.01	0.08	0.03	-0.4	0.05
Northern Cape	9%	13%	16%	14%	20%	12%	-0.26	0.33	0.48	0.05	-0.2	0.04
Western Cape	18%	13%	18%	14%	15%	12%	-0.27	-0.18	0.34	-0.16	0	-0.22*

	AVERAGE PREVALENCE 2010-2012						AVERAGE ANNUAL CHANGE IN PREVALENCE PERCENTAGE 2001-2012					
LSM	**1-4**	**5**	**6**	**7-8**	**9-10**	**TOTAL**	**1-4**	**5**	**6**	**7-8**	**9-10**	**TOTAL**
Flavoured alcoholic beverages												
Eastern Cape	10%	20%	24%	21%	17%	10%	0.41*	0.67*	1.21**	0.87*	-0.11	0.82
Free State	32%	37%	34%	22%	22%	20%	2.00***	2.30***	1.93***	0.47	0.64	2.17*
Gauteng	25%	28%	29%	26%	22%	17%	1.35***	1.15**	1.30**	1.10**	0.49	1.69**
KwaZulu-Natal	14%	20%	21%	18%	16%	11%	0.66**	0.73	0.72	0.78*	0.44	0.95
Limpopo	19%	24%	23%	26%	29%	15%	1.09**	1.36**	0.84	1.60*	1.85**	1.36
Mpumalanga	20%	25%	26%	24%	26%	16%	0.53	1	1.05*	0.95***	0.97	1.38*
North West	25%	31%	30%	27%	23%	17%	1.03*	1.19	1.28*	1.41**	0.71	2.08**
Northern Cape	19%	30%	37%	22%	22%	17%	1.00*	1.86**	2.49***	1.31*	0.92	1.20
Western Cape	7%	13%	14%	13%	12%	12%	-0.41	0.36	0.48	0.12	-0.04	1.00
Fortified wine												
Eastern Cape	3%	7%	6%	5%	5%	5%	-0.08	0.02	0.19*	-0.02	-0.44***	0.06
Free State	8%	9%	7%	6%	4%	7%	0.41	0.62***	0.26	0.15	-0.23	0.29*
Gauteng	3%	5%	5%	6%	6%	6%	-0.01	0.14	0.12	0.08	-0.13	0.13*
KwaZulu-Natal	2%	1%	3%	4%	4%	3%	0.04	-0.16	-0.04	-0.01	-0.05	0.06
Limpopo	4%	7%	3%	4%	5%	5%	0.05	0.15	-0.17	0.04	0.35	0.27*
Mpumalanga	2%	4%	4%	6%	7%	4%	-0.09	-0.01	-0.09	0.18	-0.01	-0.01
North West	7%	6%	7%	10%	7%	8%	0.15	0	0.43*	0.55*	0.05	0.44***
Northern Cape	6%	5%	10%	10%	11%	6%	0.26	0.22	0.52	0.93*	0.28	0.16
Western Cape	6%	8%	12%	10%	11%	6%	-0.1	0.19	0.55	0.33	0.07	0.02
Liqueur												
Eastern Cape	4%	9%	12%	10%	8%	7%	-0.11	0.14	0.51	0.17	-0.45*	0.08
Free State	20%	20%	16%	14%	10%	16%	1.23**	1.34***	0.84**	0.26	0.21	0.94***
Gauteng	14%	13%	15%	13%	10%	13%	0.76**	0.68**	0.64***	0.49**	-0.03	0.53**
KwaZulu-Natal	6%	6%	9%	6%	7%	6%	0.24**	0.05	0.3	0.14	-0.09	0.25*
Limpopo	8%	12%	12%	12%	11%	11%	0.41*	1.00*	0.96	0.46	0.67	0.76***
Mpumalanga	10%	13%	15%	11%	15%	12%	0.37	0.64	0.66*	0.59*	0.55	0.69**
North West	14%	17%	16%	14%	12%	12%	0.86***	0.98*	0.98**	0.58*	0.08	0.75***
Northern Cape	10%	15%	20%	12%	13%	15%	0.61**	0.94**	1.63***	0.46	0.22	0.89***
Western Cape	4%	6%	9%	6%	6%	10%	-0.24	0.01	0.43	0.03	-0.42	0.29
Natural table wine (boxes)												
Eastern Cape	4%	8%	8%	8%	10%	6%	-0.02	0.06	0.23	-0.24	-1.2**	-0.02
Free State	15%	11%	8%	7%	10%	10%	0.96***	0.71*	0.15	-0.51*	-0.86***	0.28**
Gauteng	9%	9%	10%	9%	10%	10%	0.34*	0.24*	0.35**	-0.05	-0.71*	0.09
KwaZulu-Natal	5%	5%	5%	5%	7%	5%	-0.01	0	-0.03	-0.17**	-0.75**	-0.12
Limpopo	6%	8%	5%	10%	8%	8%	0.26*	0.38*	0.17	0.2	-0.18	0.39***
Mpumalanga	6%	6%	8%	6%	11%	7%	0.05	-0.19	0.48*	-0.29	-0.76*	0.04
North West	9%	11%	7%	11%	11%	13%	0.21	0.23	-0.11	0.09	-0.4	0.73**
Northern Cape	14%	11%	19%	10%	15%	9%	0.80*	1.01*	1.58**	0.5	0.13	0.2
Western Cape	15%	13%	10%	8%	8%	10%	0.53	0.65*	0.47*	-0.08	-0.98**	-0.07

	AVERAGE PREVALENCE 2010-2012						AVERAGE ANNUAL CHANGE IN PREVALENCE PERCENTAGE 2001-2012					
LSM	**1-4**	**5**	**6**	**7-8**	**9-10**	**TOTAL**	**1-4**	**5**	**6**	**7-8**	**9-10**	**TOTAL**
Natural table wine (corked bottles)												
Eastern Cape	4%	8%	9%	9%	11%	7%	0.03	0.31*	0.38*	-0.12	-0.79*	0.18
Free State	15%	13%	12%	10%	13%	13%	1.02**	0.79*	0.70**	0.06	-0.38	0.59**
Gauteng	8%	10%	11%	11%	15%	12%	0.34*	0.47*	0.54***	0.2	-0.41	0.38*
KwaZulu-Natal	5%	6%	6%	8%	11%	6%	0.16	0.04	0.23	0.27	-0.4	0.14
Limpopo	7%	9%	6%	13%	9%	9%	0.28	0.73**	0.21	0.64	-0.1	0.46*
Mpumalanga	6%	8%	8%	10%	15%	8%	0.15	0.06	0.25	0.28	0.01	0.28*
North West	9%	13%	9%	12%	15%	11%	0.28	0.36	0.24	0.28	-0.65	0.68***
Northern Cape	11%	11%	10%	10%	16%	10%	0.74**	0.99***	0.70*	0.82	-0.02	0.26
Western Cape	7%	9%	8%	9%	17%	10%	0.37	0.51*	0.46**	-0.06	-1.04**	-0.11
Rum												
Eastern Cape	1%	4%	3%	4%	4%	2%	-0.20**	-0.12	-0.07	0.03	-0.09	-0.1
Free State	10%	10%	6%	5%	4%	8%	0.66**	0.67**	0.45*	0.08	-0.08	0.43***
Gauteng	4%	6%	6%	6%	5%	6%	0.13	0.25*	0.17	0.12	-0.08	0.14*
KwaZulu-Natal	2%	5%	4%	3%	2%	3%	0.08	0.19	0.09	0	-0.18	0.10*
Limpopo	4%	5%	3%	4%	3%	5%	0.16	0.23	0.14	0.01	-0.16	0.27**
Mpumalanga	4%	5%	5%	3%	10%	5%	0.01	-0.07	0.15	-0.13	0.21	0.05
North West	6%	5%	6%	8%	7%	5%	0.17	-0.04	0.36*	0.37*	0	0.12
Northern Cape	4%	5%	9%	8%	8%	6%	0.03	0.03	0.57	0.41	0.27	0.20*
Western Cape	5%	4%	6%	5%	5%	6%	0.18	-0.07	0.23*	0.17*	0.28*	0.21*
Sorghum beer												
Eastern Cape	11%	6%	4%	2%	0%	7%	0	0.06	0.12	-0.01	-0.1	-0.26
Free State	19%	11%	8%	5%	0%	10%	0.51	0.45*	0.39*	0.30*	0	-0.06
Gauteng	9%	7%	4%	2%	1%	3%	-0.21	0.03	-0.03	-0.07	-0.07	-0.3***
KwaZulu-Natal	7%	6%	3%	1%	1%	5%	-0.27*	0.11	0.02	0.01	-0.03	-0.26**
Limpopo	6%	5%	2%	3%	1%	5%	-0.07	-0.02	-0.33*	0.03	-0.12	-0.15
Mpumalanga	10%	7%	5%	1%	1%	5%	0	-0.06	0.06	0.03	0.08	-0.18
North West	15%	8%	7%	2%	1%	9%	0.01	0.12	-0.01	0.1	0.07	-0.05
Northern Cape	18%	9%	6%	4%	2%	8%	0.31	-0.14	0.31	0.21	0.2	-0.43**
Western Cape	2%	3%	4%	3%	2%	2%	-0.56**	-0.2	0.09	0.09	0.1	-0.14*
Sparkling wine/Champagne												
Eastern Cape	2%	4%	7%	7%	11%	4%	-0.23	-0.43	-0.04	0.1	0.22	-0.17
Free State	11%	9%	10%	10%	6%	10%	0.59	0.46*	0.1	0.45	0.09	0.38
Gauteng	6%	8%	11%	11%	12%	11%	0.02	0.17	0.48*	0.36*	0.53***	0.47**
KwaZulu-Natal	3%	4%	6%	6%	8%	5%	-0.01	-0.2	0.16	0.2	0.26*	0.09
Limpopo	6%	10%	9%	9%	10%	8%	0.34**	0.22	0.18	0.53	0.98	0.51**
Mpumalanga	5%	7%	9%	7%	13%	7%	0.03	-0.4	0.11	0.07	0.78*	0.1
North West	6%	13%	8%	16%	12%	8%	0.03	0.42*	0.06	1.08***	0.69*	0.4*
Northern Cape	6%	6%	15%	7%	10%	10%	0.18	0.31	0.93*	0.29	0.45	0.31
Western Cape	6%	5%	7%	6%	7%	8%	0.05	-0.02	0.19	0.12	0.09	0.28*
Whisky												
Eastern Cape	2%	11%	10%	13%	14%	7%	-0.09	0.63**	0.56	0.45*	-0.29	0.22
Free State	19%	20%	17%	16%	16%	18%	1.49***	1.65***	1.45***	0.39*	-0.09	1.19***
Gauteng	10%	15%	17%	15%	16%	15%	0.55*	1.02***	1.06***	0.63***	0.12	0.75***
KwaZulu-Natal	7%	10%	12%	11%	12%	10%	0.44***	0.47*	0.59**	0.34*	0.04	0.5***
Limpopo	6%	8%	10%	12%	12%	9%	0.43*	0.51	0.69	0.18	0.08	0.67***
Mpumalanga	7%	11%	14%	13%	20%	12%	0.31	0.47	0.95***	0.32	0.66	0.67**
North West	12%	12%	14%	19%	19%	11%	0.83*	0.68***	0.79**	0.82*	0.15	0.52**
Northern Cape	8%	11%	15%	9%	19%	13%	0.38	0.43	1.00*	0.41	0.15	0.75***
Western Cape	4%	4%	11%	9%	9%	12%	-0.23	-0.32	0.43	-0.26	-0.48	0.14

	AVERAGE PREVALENCE 2010-2012						AVERAGE ANNUAL CHANGE IN PREVALENCE PERCENTAGE 2001-2012					
LSM	**1-4**	**5**	**6**	**7-8**	**9-10**	**TOTAL**	**1-4**	**5**	**6**	**7-8**	**9-10**	**TOTAL**
White spirits												
Eastern Cape	5%	9%	6%	5%	4%	6%	-0.44*	0.18	-0.2	-0.27	-0.74***	-0.36
Free State	15%	10%	6%	6%	4%	8%	0.77*	0.41	0.05	-0.1	-0.02	-0.2
Gauteng	7%	9%	6%	6%	5%	6%	-0.13	-0.12	-0.2	0.01	-0.32	0.12
KwaZulu-Natal	6%	7%	8%	5%	5%	6%	-0.46**	-0.45	-0.04	-0.29**	-0.38	-0.14
Limpopo	6%	7%	5%	3%	2%	6%	0.33*	0.39*	-0.05	0.05	-0.18	0.07
Mpumalanga	4%	6%	7%	3%	6%	5%	-0.21	-0.46	0.25	-0.07	0.12	0.21
North West	7%	6%	7%	6%	3%	5%	-0.31	-0.87**	-0.35	0.15	-0.2	-0.1
Northern Cape	4%	5%	10%	4%	5%	6%	-0.06	-0.18	0.82*	0.16	0.12	-0.27
Western Cape	5%	8%	9%	8%	8%	5%	-0.29	-0.1	0.09	-0.21	-0.32	-0.1

Source: *AMPS (various years)*

TABLE 11: *THE PREVALENCE OF HEAVY DRINKING FOR DIFFERENT LIVING STANDARD MEASURES (LSM) IN DIFFERENT PROVINCES*

	AVERAGE PREVALENCE 2010-2012						AVERAGE ANNUAL CHANGE IN PREVALENCE PERCENTAGE 2001-2012					
LSM	**1-4**	**5**	**6**	**7-8**	**9-10**	**TOTAL**	**1-4**	**5**	**6**	**7-8**	**9-10**	**TOTAL**
Beer												
Eastern Cape	4%	7%	6%	7%	6%	5%	0.01	0	-0.23	-0.28*	-0.62**	-0.08
Free State	14%	9%	11%	10%	6%	11%	0.25	-0.38*	0.17	0.11	-0.25	0.07
Gauteng	13%	10%	12%	11%	12%	12%	0.19	0.19	-0.1	-0.02	0.19*	0.22*
KwaZulu-Natal	3%	4%	5%	7%	7%	5%	-0.29**	-0.27	-0.12	-0.11	-0.33**	-0.14*
Limpopo	7%	10%	8%	9%	15%	9%	0.09	0.01	-0.08	-0.01	0.22	0.37**
Mpumalanga	8%	8%	9%	9%	11%	8%	0.02	-0.33	-0.11	-0.06	0.09	0.14
North West	11%	7%	9%	10%	10%	10%	0.21	-0.56	-0.18	-0.01	-0.18	0.41
Northern Cape	12%	10%	12%	6%	5%	9%	0.49*	0.42	0.46	-0.24	-0.19	-0.04
Western Cape	12%	9%	9%	9%	8%	8%	0.63**	0.04	-0.06	-0.08	-0.21	-0.07
Brandy												
Eastern Cape	4%	5%	3%	5%	5%	4%	-0.05	-0.15	-0.39*	-0.57***	-0.50*	-0.23
Free State	10%	5%	4%	5%	4%	5%	0.45*	-0.03	-0.24	-0.23	-0.62***	-0.07
Gauteng	3%	4%	4%	4%	5%	4%	-0.08	-0.13	-0.26*	-0.37**	-0.25***	-0.16*
KwaZulu-Natal	2%	2%	3%	2%	3%	2%	-0.26**	-0.36*	-0.21	-0.25*	-0.30**	-0.21**
Limpopo	2%	2%	2%	3%	3%	2%	0.11*	-0.26	0.23	-0.25	-0.42	0.09
Mpumalanga	2%	3%	5%	3%	5%	3%	-0.13	-0.37*	-0.25	-0.73***	-0.05	-0.1
North West	3%	4%	3%	6%	5%	4%	0.08	-0.19	-0.09	-0.1	-0.63***	0.03
Northern Cape	1%	4%	2%	8%	10%	3%	-0.11	-0.05	-0.33	0.11	-0.15	-0.08
Western Cape	7%	5%	8%	5%	7%	5%	0.04	-0.06	0.2	-0.31*	-0.16*	-0.14*
Flavoured alcoholic beverages												
Eastern Cape	3%	8%	9%	8%	7%	4%	0.12	0.42**	0.57*	0.41	0.17	0.36
Free State	14%	13%	18%	11%	10%	9%	0.83**	0.61*	1.19***	0.56	0.53	1.32***
Gauteng	11%	10%	14%	13%	11%	8%	0.57*	0.28	0.53	0.69*	0.55*	1.02***
KwaZulu-Natal	5%	7%	8%	8%	6%	4%	0.17	0.2	0.42	0.34	0.26	0.33
Limpopo	8%	16%	16%	18%	20%	8%	0.56**	0.93*	0.88*	1.62**	1.82***	1.12**
Mpumalanga	8%	11%	10%	10%	13%	7%	0.27	0.08	-0.09	0.65***	0.62*	0.65*
North West	9%	13%	14%	12%	12%	7%	0.3	0.33	0.54	0.65	0.71**	1.25**
Northern Cape	7%	15%	13%	11%	8%	8%	0.44	0.75	1.03***	0.96*	0.48*	0.83
Western Cape	1%	5%	5%	5%	4%	4%	-0.36	0.07	0.18	0.11	0.07	0.43

	AVERAGE PREVALENCE 2010-2012						AVERAGE ANNUAL CHANGE IN PREVALENCE PERCENTAGE 2001-2012					
LSM	**1-4**	**5**	**6**	**7-8**	**9-10**	**TOTAL**	**1-4**	**5**	**6**	**7-8**	**9-10**	**TOTAL**
Fortified wine												
Eastern Cape	1%	2%	1%	1%	1%	1%	0	0.04	-0.07	-0.04	-0.18**	0.02
Free State	3%	1%	1%	1%	1%	2%	0.16	-0.01	-0.06	-0.09	-0.02	0.06
Gauteng	1%	1%	1%	1%	1%	1%	0.01	0.03	-0.06*	-0.02	-0.11**	-0.02
KwaZulu-Natal	0%	0%	1%	1%	1%	1%	0.03	0.01	-0.05	-0.05	-0.02	0
Limpopo	1%	2%	0%	2%	2%	1%	-0.01	0.08	-0.08	0.02	0.18***	0
Mpumalanga	1%	2%	0%	1%	1%	1%	0.05	0.07	-0.12	-0.02	0.01	0
North West	2%	0%	1%	1%	1%	2%	0.07	-0.13	-0.09	0.11	-0.01	0.1**
Northern Cape	1%	2%	3%	4%	3%	1%	0.02	0.14	0.24	0.41*	0	0
Western Cape	1%	4%	3%	3%	4%	2%	-0.06	0.05	0.17	0.09	0.07	0.02
Liqueur												
Eastern Cape	1%	3%	2%	2%	2%	2%	-0.07	0.08	-0.06	-0.13	-0.21	-0.01
Free State	7%	5%	4%	5%	2%	5%	0.44**	0.30**	0.06	0.21	-0.1	0.29**
Gauteng	4%	3%	4%	4%	3%	4%	0.3	0.11	0.03	0.16	0.01	0.12
KwaZulu-Natal	1%	2%	2%	2%	2%	2%	-0.01	0.10*	0.03	0	-0.04	0.04
Limpopo	2%	3%	2%	6%	6%	3%	0.08	0.19	-0.05	0.28	0.56	0.16*
Mpumalanga	2%	3%	4%	2%	4%	3%	0.02	0.04	0.06	0.16	0.15	0.09
North West	4%	4%	5%	6%	3%	2%	0.22*	0.04	0.2	0.48**	0.01	0.06
Northern Cape	2%	3%	4%	5%	2%	4%	0.03	-0.03	0.39	0.35	-0.09	0.23**
Western Cape	1%	1%	3%	2%	2%	3%	-0.1	-0.1	0.07	-0.04	-0.06	0.07
Natural table wine (boxes)												
Eastern Cape	1%	2%	1%	2%	3%	2%	0.02	0.01	-0.05*	-0.23**	-0.64***	0.02
Free State	5%	2%	2%	1%	2%	2%	0.51***	0.07	-0.02	-0.23*	-0.33**	0.1
Gauteng	1%	1%	2%	2%	3%	2%	-0.01	0.03	0.03	-0.12*	-0.39***	-0.06
KwaZulu-Natal	1%	1%	1%	1%	3%	1%	0	-0.04	-0.05	-0.15***	-0.46***	-0.08*
Limpopo	2%	1%	2%	3%	3%	2%	0.09*	0	0.13*	0.06	0.1	0.11
Mpumalanga	2%	2%	1%	2%	2%	1%	0.01	0.05	0.06	-0.12	-0.29*	0
North West	2%	2%	1%	3%	2%	3%	0.01	-0.07	-0.03	-0.18	-0.44*	0.03
Northern Cape	3%	2%	5%	3%	3%	2%	0.21	0.06	0.42*	0.06	-0.03	-0.03
Western Cape	11%	3%	3%	2%	2%	3%	0.69	0.07	0.12	-0.09	-0.65**	-0.12
Natural table wine (corked bottles)												
Eastern Cape	1%	2%	2%	1%	3%	2%	0.07	0.16**	0.09	-0.17*	-0.39**	0.07*
Free State	6%	2%	2%	2%	3%	3%	0.49*	0.07	0	0	-0.07	0.08
Gauteng	1%	2%	2%	3%	5%	3%	0.02	0.15	0.09***	0.08	-0.17	0.1
KwaZulu-Natal	1%	1%	1%	2%	4%	1%	0.04	-0.02	0.01	0	-0.21	0.03
Limpopo	1%	2%	2%	5%	4%	2%	0.04	0.07	0.21	0.44*	0.1	0.14**
Mpumalanga	1%	2%	1%	2%	3%	1%	0.09	-0.04	-0.11	0.05	0.09	0.04
North West	2%	1%	2%	4%	4%	3%	0.11	-0.05	-0.01	0.14	-0.37	0.18
Northern Cape	3%	2%	4%	3%	3%	2%	0.19	-0.03	0.26	0.31	-0.05	0.04
Western Cape	1%	3%	2%	3%	6%	3%	0.32	0.19*	0.15*	-0.09	-0.48**	-0.05
Rum												
Eastern Cape	0%	0%	1%	1%	1%	0%	-0.04	-0.09	-0.08	-0.08	-0.18***	0
Free State	2%	2%	1%	1%	1%	1%	0.1	0.07	0.07	-0.08	-0.09*	0.04
Gauteng	0%	1%	1%	1%	1%	1%	-0.02	0.06	-0.06	-0.07*	-0.13**	-0.04
KwaZulu-Natal	0%	1%	1%	1%	1%	0%	-0.02	0.05*	-0.04	-0.06	-0.11**	0
Limpopo	1%	0%	0%	0%	1%	1%	0.06	-0.08	-0.01	-0.06	-0.2	0
Mpumalanga	1%	1%	1%	1%	3%	1%	-0.01	-0.04	-0.03	-0.14	-0.01	-0.02
North West	1%	0%	1%	2%	1%	1%	0.08	-0.14	-0.07	-0.08	-0.24**	0
Northern Cape	1%	1%	1%	2%	1%	1%	0.07	0.05	-0.05	-0.04	-0.1	0
Western Cape	3%	0%	2%	1%	1%	1%	0.44*	-0.10*	0.08	-0.02	-0.03	-0.02

	AVERAGE PREVALENCE 2010-2012						AVERAGE ANNUAL CHANGE IN PREVALENCE PERCENTAGE 2001-2012					
LSM	**1-4**	**5**	**6**	**7-8**	**9-10**	**TOTAL**	**1-4**	**5**	**6**	**7-8**	**9-10**	**TOTAL**
Sorghum beer												
Eastern Cape	4%	2%	1%	0%	0%	2%	0.06	0.01	-0.07	0	-0.01	-0.12
Free State	6%	2%	1%	0%	0%	2%	-0.07	-0.11	0.01	-0.06	-0.07	-0.26**
Gauteng	2%	2%	1%	0%	0%	1%	-0.30*	-0.04	-0.07	-0.03	-0.03	-0.11**
KwaZulu-Natal	2%	2%	1%	0%	0%	1%	-0.15	-0.02	-0.07	-0.02	-0.05	-0.16**
Limpopo	2%	1%	0%	0%	0%	1%	-0.13	-0.12	-0.06	-0.23	-0.14	-0.17**
Mpumalanga	3%	2%	1%	0%	0%	1%	-0.1	-0.23	-0.03	0.03	0.03	-0.23**
North West	5%	2%	1%	0%	0%	2%	-0.11	-0.07	-0.15	0.12	0.02	0.01
Northern Cape	5%	1%	1%	0%	0%	2%	0.12	0.12	-0.03	-0.23	-0.24	-0.35***
Western Cape	1%	0%	1%	1%	0%	0%	0.07	-0.03	0.02	0.05	0.15	0
Sparkling wine/Champagne												
Eastern Cape	0%	1%	1%	2%	3%	1%	-0.06	-0.09	-0.09	0.02	0.05	-0.08*
Free State	3%	2%	3%	3%	1%	3%	0.22	0.04	0.17*	0.11	0.04	0.16**
Gauteng	2%	3%	3%	4%	4%	4%	0.13	0.16*	0.18*	0.23*	0.22**	0.23*
KwaZulu-Natal	1%	1%	1%	2%	2%	1%	0.04	-0.03	0.02	0.16*	0.18**	0.03
Limpopo	2%	3%	3%	4%	3%	3%	0.16*	0.22	0.24	0.29*	0.46	0.16*
Mpumalanga	1%	1%	3%	2%	6%	2%	0.09	-0.11	0.05	0.09	0.54*	0.04
North West	2%	2%	2%	4%	5%	2%	0.06	0.01	0.12	0.33**	0.4**	0.07*
Northern Cape	1%	1%	3%	1%	1%	3%	0.08	0.01	0.14	-0.1	-0.11	0.14*
Western Cape	2%	1%	2%	2%	2%	2%	0.27	-0.02	0.14*	0.06	0.1	0.11*
Whisky												
Eastern Cape	0%	4%	3%	4%	6%	2%	-0.02	0.24**	0.13	0.01	-0.41*	0.08
Free State	8%	5%	6%	7%	6%	6%	0.73**	0.42***	0.52***	0.16	-0.28*	0.41***
Gauteng	3%	4%	6%	6%	7%	6%	0.21**	0.23*	0.37***	0.20**	0	0.28***
KwaZulu-Natal	2%	2%	5%	4%	5%	3%	0.14*	0.04	0.19	0.03	-0.18*	0.15**
Limpopo	2%	4%	3%	2%	4%	3%	0.16*	0.4***	0.21	-0.23	-0.52	0.23***
Mpumalanga	2%	3%	5%	4%	8%	4%	0.13*	0.19	0.38*	-0.1	0.32	0.25***
North West	4%	3%	5%	9%	8%	3%	0.3*	0.09	0.25*	0.41*	-0.17	0.16*
Northern Cape	2%	2%	4%	4%	7%	4%	0.15	-0.02	0.17	0.22	-0.19	0.3***
Western Cape	2%	2%	4%	3%	5%	5%	0.17	0	0.09	-0.27	-0.28	0.06
White spirits												
Eastern Cape	3%	5%	2%	2%	1%	3%	-0.03	0.2	-0.17	-0.12	-0.51***	-0.14
Free State	8%	5%	2%	3%	2%	4%	0.58*	0.27	-0.08	-0.07	0.08	-0.04
Gauteng	2%	4%	2%	3%	2%	3%	-0.19	-0.03	-0.21*	0.05	-0.21*	0.07
KwaZulu-Natal	3%	2%	3%	2%	2%	3%	-0.38*	-0.33*	-0.2	-0.29**	-0.25**	-0.01
Limpopo	3%	4%	3%	1%	1%	3%	0.17*	0.44**	0.1	0.05	0.03	0.05
Mpumalanga	2%	2%	2%	1%	2%	2%	-0.03	-0.25	0.04	-0.06	0.11	0.12
North West	2%	2%	3%	4%	1%	2%	-0.17	-0.38*	-0.34	0.22	-0.04	0.03
Northern Cape	2%	1%	4%	2%	1%	2%	0.15	0.2	0.24	0.19	-0.1	-0.01
Western Cape	2%	4%	5%	4%	4%	3%	0.01	-0.01	0.15	-0.17	-0.15	-0.01

Source: *AMPS (various years)*

3. CONCLUSION

Overall there appears to be a move away from the traditional (sorghum beer) and lower cost drinks (e.g., boxed wine and lower value spirits) towards increased consumption of high value drinks such as whisky, liqueur and sparkling wine or Champagne. Flavoured Alcoholic Beverages (FABs) in particular have emerged as a favoured drink, with statistically significant increasing trends across almost all race, gender and age groups. The increases have been most dramatic among the younger age group (15-17 years) and among females. This is most likely due to the introduction of many new FABs into the market that target youth and women in particular. For example *Brutal Fruit* host a large "GlamCamp" for women only as part of their marketing campaign.

Important prevalence results to be noted are as follows:

- The alcohol category with the highest total prevalence and female prevalence is FABs with 22% and 21% respectively, with increasing significant trends in both genders
- The highest male prevalence of use is found for beer with 34% prevalence. There is no significant change in trend since 2001.
- The largest "gender gap" is in beer (where male prevalence is nearly 4 times that of females), followed by spirits (male prevalence is about twice that of females) and by wines (male prevalence is marginally higher than female prevalence).
- There is only one category where female prevalence exceeds that of males, namely sparkling wine/Champagne (8% vs. 7%).
- The Free State generally has the highest drinking prevalence rates out of all the provinces, reaching its peak for males drinking beer (41%) and for females drinking FABs (30%)
- Geographically, heavy prevalence rates are more dispersed among provinces, with peaks being found in Gauteng for beer-drinking males (21%) and in the Free State for females who drink FABs (14%).
- White males are found to have the highest prevalence rates out of all the race categories for beer, brandy, whisky, corked natural table wine and sparkling wine (36%, 20%, 19%, 15% and 9%), yet in all of these categories, apart from sparkling wine, white male prevalence is declining annually at 0.87%, 0.35%, 0.22% and 0.37% respectively. In the same categories, apart from brandy, black male prevalence is increasing, therefore narrowing the race gap, especially for whisky.
- Black males have high prevalence for FABs (25%), liqueur (12%), sorghum beer (9%) and white spirits (9%). Prevalence of use of FABs and liqueurs is increasing by 1.32% and 0.5%, while prevalence of sorghum beer and white spirits is declining at 0.57% and 0.44% respectively. This suggests a move towards higher value "popular" drinks and away from traditional, lower value drinks.
- Generally the LSMs with the highest prevalence are LSM 5 and LSM 6, with prevalence levels between 23% and 28% for beer and between 14% and 33% for FABs.
- LSM 9-10 has a significant and declining trend for beer, brandy, natural table wine (corked and boxed) across all ages, except for whisky, where the significant declining trend is only found above the age of 50 years (0.37%).
- Underage drinking prevalence (15-17 years) reaches 19% for FABs in LSM 5 and 6 and heavy prevalence reaches 9% in LSM 6. Other alcohol categories where underage drinking is high include liqueur, beer and spirits.

REFERENCES

South African Audience Research Foundation (SAARF). 2013. saarf.co.za - /amps-technicalreport/. [online] Available: http://saarf.co.za/amps-technicalreport/ *[Accessed 23 August 2013]*

Van Walbeek, CP, 2002. Recent trends in smoking prevalence in South Africa: Some evidence from AMPS data. *South African Medical Journal*, 92(6):468-472.

APPENDIX 1

The questions from the AMPS survey used in compiling the results include:

- How many bottles/cans/glasses of **flavoured alcoholic beverages** (i.e. alcoholic fruit beverages, cider and spirit coolers) have you personally consumed during the **PAST 7 DAYS**?
  These include Bacardi, Smirnoff, Hunters and Savannah
- How many glasses of **liqueur** have you personally consumed during the **PAST 7 DAYS**?
  These include Cape Velvet, Kahlua, Jagermeister and Oude Meester
- How many bottles/ cans/ glasses of **beer** (regular beer, excluding light/lite beer and sorghum beer) have you personally consumed during the **PAST 7 DAYS**?
  These include Amstel, Castle, Guinness
- How many cartons of **sorghum beer** (bought from a store—not home brew) have you personally consumed during the **PAST 7 DAYS**?
  These include BB, Ijuba, Leopard
- How many glasses of **natural table wine - in bottles** have you personally consumed during the **PAST 7 DAYS**?
  These include Alto, Drosty-Hof and KWV
- How many glasses of **natural table wine - in boxes/ jugs** have you personally consumed during the **PAST 7 DAYS**?
  These include Drosty Hof, Robinson, Namaqua
- How many glasses of **fortified wine** (e.g. port, sherry, muscadel, etc) have you personally consumed during the **PAST 7 DAYS**?
  These include Monis and Old Brown Sherry
- How many tots of **cane** have you personally consumed during the **PAST 7 DAYS**?
  These include Absolut, Cape to Rio,
- How many tots of **gin** have you personally consumed during the **PAST 7 DAYS**?
- How many tots of **vodka** have you personally consumed during the **PAST 7 DAYS**?
- How many tots of **brandy** have you personally consumed during the **PAST 7 DAYS**?
  These include Klipdrift, Commando, Bols
- How many tots of **whisky** have you personally consumed during the **PAST 7 DAYS**?
  These include Bains, Bells, Famous Grouse, Jack Daniels
- How many tots of **rum** have you personally consumed during the **PAST 7 DAYS**?
  These include Bacardi and Red Heart
- How many tots of **other spirits** (e.g. tequila, sambucca, schnapps, vermouth, aperitifs, shooters, etc.) have you personally consumed during the **PAST 7 DAYS**?
- How many glasses of **sparkling wine/Champagne** have you personally consumed during the **PAST 4 WEEKS**?

All answers (numbers) to be written below the question

APPENDIX 2

The following table lists the 2000 SAARF LSM variables which have been created for the 2011 AMPS survey. They contain the weights for each question, some of which are negative (e.g. rural resident).

TABLE A: 2011 SAARF LSM'S VARIABLE USED TO DETERMINE LSM SCORE

QUESTION	ANSWER	WEIGHTING IF TRUE
1. I have the following in my household :		
· TV set	True/False	0.120814
· Swimming pool	True/False	0.166031
· DVD player/ Blu-ray Player	True/False	0.096070
· Pay TV (M-Net/DStv/Top TV) subscription	True/False	0.127360
· Air-conditioner (excl. fans)	True/False	0.178044
· Computer/Desktop/Laptop	True/False	0.311118
· Vacuum cleaner/floor polisher	True/False	0.164736
· Dishwashing machine	True/False	0.212562
· Washing machine	True/False	0.149009
· Tumble dryer	True/False	0.166056
· Home telephone (excluding a cell)	True/False	0.104531
· Deep freezer – freestanding	True/False	0.116673
· Refrigerator or combined fridge/freezer	True/False	0.134133
· Electric stove	True/False	0.163220
· Microwave oven	True/False	0.126409
· Built-in kitchen sink	True/False	0.132822
· Home security service	True/False	0.151623
· 3 or more cell phones in household	True/False	0.184676
· 2 cell phones in household	True/False	0.124007
· Home theatre system	True/False	0.096072
2. I have the following amenities in my home or on the plot:		
· Tap water in house/on plot	True/False	0.123015
· Hot running water from a geyser	True/False	0.185224
· Flush toilet in/outside house	True/False	0.113306
3. There is a motor vehicle in our household	True/False	0.167310
4. I am a metropolitan dweller	True/False	0.079321
5. I live in a house, cluster or town house	True/False	0.113907
	ALL TRUE Total	**3.808049**
6. I live in a rural area outside Gauteng and the Western Cape	True/False	-0.129361
7. There are no radios, or only one radio (excluding car radios) in my household	True/False	-0.245001
8. There are no domestic workers or household helpers in household (incl. both live-in & part time domestics and gardeners)	True/False	-0.301327

Carry over the weights of all questions that you have marked as "True" to the last blank column and add them up. Then subtract the constant of **0.810519** from your total score, to find your final LSM® score.

THE TABLE BELOW HELPS ONE TO DETERMINE THEIR LSM® GROUP:

IF YOUR SCORE IS.:	YOU ARE IN LSM®:
Less than -1.390140	1
Between -1.390140 to -1.242001	2
Between -1.242000 to -1.011801	3
Between -1.011800 to -0.691001	4
Between -0.691000 to -0.278001	5
Between -0.278000 to 0.381999	6
Between 0.382000 to 0.800999	7
Between 0.801000 to 1.168999	8
Between 1.169000 to 1.744999	9
More than 1.744999	10

SAARF LSM POPULATION PROPORTIONS 2011/2012:

	CUMULATIVE POPULATION (%)	LSM GROUP PROPORTION
LSM 1	1.9	
LSM 2	7	
LSM 3	13.1	
LSM 4	25.3	**LSM 1-4: 25.3%**
LSM 5	42.7	**LSM 5: 17.4**
LSM 6	65.1	**LSM 6: 22.4**
LSM 7	76.6	
LSM 8	84.9	**LSM 7-8: 19.8**
LSM 9	93.7	
LSM 10	100	**LSM 9-10: 15.1**

Source: SAARF: http://saarf.co.za/LSM/lsms.asp

THE ECONOMICS OF ALCOHOL POLICY IN SOUTH AFRICA

CHAPTER 3

Trends in Alcohol Consumption, Excise Tax, and Excise Tax Revenue in South Africa

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TRENDS IN ALCOHOL CONSUMPTION, EXCISE TAX, AND EXCISE TAX REVENUE IN SOUTH AFRICA

1. INTRODUCTION

The focus in the previous chapter was on the prevalence of alcohol use. The source data were obtained from a commercially generated database, and the chapter considered average prevalence in 2010-2012, and changes in the prevalence between 2001 and 2012. In this chapter the focus is not so much on prevalence, but rather on aggregate consumption of alcohol.

The source for most of the data used in this chapter is the National Treasury (further as Treasury). The Treasury has a strong vested interest in knowing how much alcohol is being consumed, since alcohol in South Africa is subject to excise taxes, as is the case in most other countries.

A repeated theme in this report is the relationship between alcohol consumption, alcohol price and alcohol excise tax. An increase in the excise tax on alcohol would be expected to increase the retail price of alcohol, on the assumption that the alcohol industry passes the tax increase on to the consumers. An increase in the retail price would be expected to decrease the consumption of alcohol, according to the law of demand. The relative sensitivity of the demand (consumption) of alcohol depends on the price elasticity of demand. The international literature (see Chapter 7), and the South African experience (see Chapter 8) indicate that the demand for alcohol is price inelastic, i.e. that a given percentage increase in the price of alcohol results in a lesser percentage decrease in consumption.

The Treasury has a particular interest in excise tax revenue. Excise tax revenue is the product of the excise tax per unit (which the Treasury has direct control over), and the quantity of (legal) alcohol sold. This quantity is the result of numerous influences which are not under the direct control of either the industry or the Treasury.

The structure of this paper is as follows: Section 2 discusses the data used and the strengths and limitations of the data. Trends in alcohol consumption since 1960 are discussed in section 3, and trends in alcohol taxation are discussed in section 4. Trends in excise tax revenue are discussed in section 5. Section 6 provides a statistical overview of the deviations between budgeted excise tax revenues and actual excise tax revenues for the various categories of alcohol, but also for some other sources of revenue. Section 7 sums up the earlier sections and presents the conclusions we have drawn from them.

In this chapter we do not consider trends in prices. These are considered in the next chapter.

2. DATA

For alcohol, the Treasury reports on excise tax revenues in four categories: (1) beer, (2) traditional beer and traditional beer powder, (3) wine and other fermented beverages, and (4) spirits.

We obtained data on budgeted and actual revenues for these four categories of alcohol from the annual Budget Reviews, published in February each year. This data source was used to obtain revenue data from the mid-1990s onwards. For earlier data, we obtained the budgeted and actual revenue from the annual Auditor-General's reports. These go back as far as 1910 when the Union of South Africa was founded. Excise revenue has been collected on beer and spirits since 1910. In 1942 excise taxes on wine were introduced. In 1992 an excise tax on traditional beer (typically called sorghum beer) and traditional beer

powder (sorghum beer powder) was introduced. By way of comparison, cigarettes and tobacco have been subject to excise taxes since 1911.

The benefit of levying the excise tax in the form of a specific tax is that it allows one to calculate easily the quantity of the underlying product subject to the tax, simply by dividing the total tax revenue by the appropriate tax rate per unit. If the product is fairly homogeneous, then the resulting quantity is easily interpreted. Of the four categories, beer, sorghum beer and spirits have fairly homogenous product definitions. Wine and other fermented beverages include a very large range of products, and are often taxed at differential rates. It is thus practically impossible to get an appropriate quantity of "wine and other fermented beverages" by dividing the total revenue by the appropriate excise tax per unit, because there is no single excise tax per unit.

While it might be tempting to assume that the shares of the "other fermented beverages" have remained the same over time, and apply some weighted average excise tax to the excise revenue, this would be inappropriate. The sharp increase in the consumption of Flavoured Alcoholic Beverages, discussed in the previous chapter, would make this an untenable assumption. Thus, although we would like to show the trends in wine consumption, based on the excise revenue data, this is not possible using Budget Review data.

South African Wine Industry Information and Systems NPC is a not-for-gain industry body that, amongst other things, produces the South African Wine Industry Statistics (SAWIS). In their most recent publication (SAWIS, 2013), they present data on the consumption of a variety of alcoholic beverages between 1996 and 2012. For trends in consumption of different wine categories, we use this source.

We estimate the legal consumption of beer and spirits quite easily because these two categories are taxed in a relatively homogenous way. As an example, according to the 2013 Budget Review the total excise tax revenue received from beer (the "revised estimate") in 2012/13 was R 8252.3 million. The excise tax was levied at R 59.36 per litre of absolute alcohol. Thus the total taxed quantity of absolute alcohol in beer in 2012/13 was 139.02 million litres (=8252.3/59.36). Assuming that beer, on average, has a 5% alcohol content, this implies that 2780 million litres of beer were consumed (= 139.02/0.05). Dividing by the adult population of 35.47 million in 2012,[1] per capita consumption of beer in 2012/13 was 78.4 litres per person. According to Chapter 2, 21% of adults consumed beer in the past seven days. If we regard this percentage as broadly accurate, this implies that South Africa has nearly 7.5 million regular beer drinkers. The average adult beer drinker thus consumed about 370 litres of beer in 2012/13. This is one litre of beer per regular drinker per day.

3. TRENDS IN ALCOHOL CONSUMPTION

Figure 1 shows the trends in the legal consumption of beer, spirits and sorghum beer in South Africa between 1960 and 2012. Figure 2 shows the trend in per capita consumption for all people aged 15 years and older. Trends in wine consumption are shown only for the period 1996-2012 (and for calendar years, rather than financial years), and are based on data obtained from SAWIS.

It is clear that South Africa has become a country of beer drinkers over this 53-year period. Between 1960 and 1970 aggregate beer consumption in South Africa grew at an average rate of 16.1% (per capita beer consumption 13.3%), albeit from a very low base. Between 1970 and 1980 the average annual growth rate was 12.3% (9.1% for per capita consumption), decelerating slightly, but from a much higher base, to 8.5%

[1] This is obtained from Statistics South Africa's 2011 mid-year population estimate of 34.77 million people aged 15 and older, plus an assumed 2% growth rate. We could not find mid-year population estimates for 2012. The 2013 mid-year estimate was substantially larger than an extrapolation of the trend up to 2011 would suggest.

(5.0% for per capita consumption) between 1980 and 1990. The 1980s were a period of rapid urbanisation and much unrest in the African communities. Previous apartheid restrictions on alcohol use by Africans were removed (Parry and Bennetts, 1998). Shebeens in the townships became places of gathering, and beer clearly became the drink of choice.

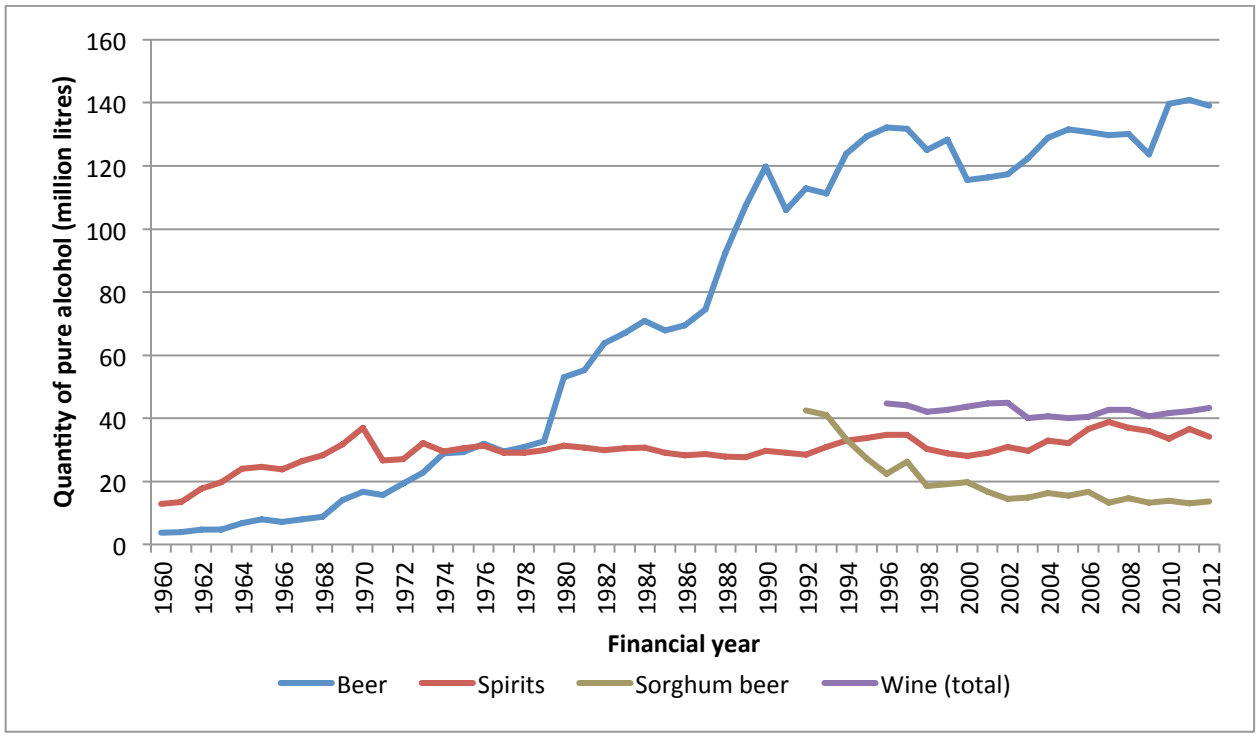
The growth in beer consumption slowed down sharply after 1990. Between 1990 and 2012 aggregate beer consumption increased at a modest rate of 0.7% per year (-0.9% for per capita consumption), although this percentage does hide sizeable volatility in the growth rate.

On the other hand, other than rapid growth in the consumption of spirits between 1960 and 1970 (aggregate growth rate of 11.1% and per capita growth rate of 8.4%), there has not been any significant growth for the past 40 years. In fact, from its peak in 1970 (2.84 litres per adult per year), annual per capita consumption of spirits has decreased at an average annual rate of 2.3% to just more than 1 litre of absolute alcohol per capita at present.

Sorghum beer was not subject to excise tax before 1992, so it is impossible to derive the quantity of commercial (and tax-paid) sorghum beer for the period before 1992. However, since the excise tax has been introduced (at very low rates), there has been a sharp decrease in the consumption of commercial sorghum beer, both at the aggregate level and especially at the per capita level. Between 1992 and 2000 commercial sorghum beer decreased at an average annual rate of 9.2% per year (-11.4% in per capita terms). Between 2000 and 2012 the rate of decrease moderated, but the decrease was still at an annualised annual rate of 3.4% in aggregate terms and 4.7% in per capita terms.

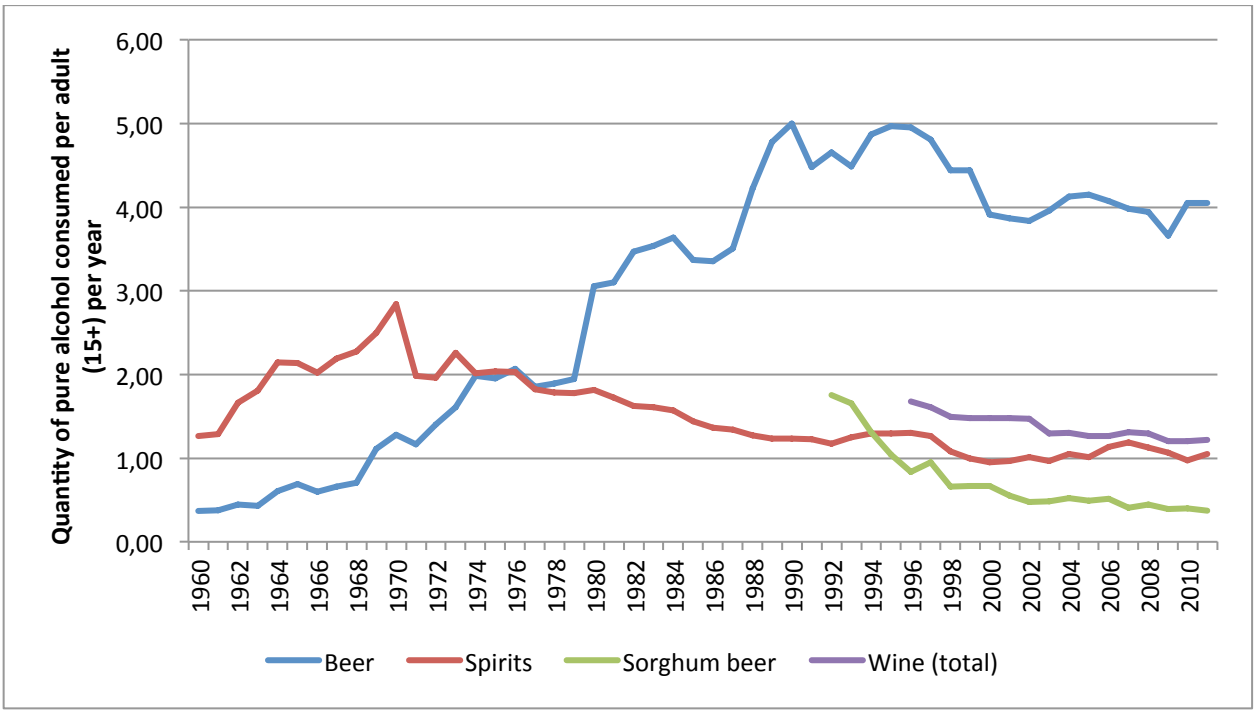
Aggregate wine consumption (defined as the total of natural wine, fortified wine and sparkling wine) has remained largely constant since 1996. Per capita wine consumption has decreased by an average of 2.1% between 1996 and 2011.

FIGURE 1: *DERIVED QUANTITIES OF ABSOLUTE ALCOHOL CONSUMED IN SOUTH AFRICA: BEER, SPIRITS, SORGHUM BEER AND WINE, 1960-2012*



Sources: Authors' calculations, based on Auditor-General Report, various issues; Budget Review, various issues; Budget Speech, various issues; SAWIS, 2013.

FIGURE 2: PER CAPITA (AGED 15 PLUS) CONSUMPTION OF ABSOLUTE ALCOHOL, BY CATEGORY, 1960-2012



Sources: Authors' calculations, based on Auditor-General Report, various issues; Budget Review, various issues; Budget Speech, various issues; SAWIS, 2013; Statistics South Africa, Mid-year Estimates, various issues.

Total consumption of alcohol consumed in South Africa, broken down into various categories, is shown in Table 1. Consumption data for malt beer, traditional African beer (i.e. sorghum beer) and spirits are derived from official government sources and refer to tax-paid quantities in South Africa only. Data for all wine subcategories and RTDs are obtained from SAWIS (2013). The SAWIS data refer to the calendar year and include consumption in the whole SACU region (South Africa, Botswana, Namibia, Lesotho and Swaziland), and as such represent a modest exaggeration of total alcohol consumption of these subcategories (but probably not more than 10%). Per capita consumption is expressed as a percentage of the population aged 15 and older.

The dominance of beer in the South African alcohol market is again highlighted, with 54% of absolute alcohol consumed in the form of beer. This is followed by natural wine (15%), spirits (13%) and RTDs (10%).

TABLE 1: AGGREGATE AND PER CAPITA CONSUMPTION OF ALCOHOL, 2012/13 FINANCIAL YEAR

PRODUCT	AGGREGATE CONSUMPTION		PER CAPITA CONSUMPTION	
	Litres of the beverage (million)	Litres of absolute alcohol (million)	Litres of the beverage	Litres of absolute alcohol
Malt beer	2780	139.0	78.4	3.9
Traditional African beer	457	13.7	12.9	0.4
Unfortified (i.e. natural) wine	319	38.3	9.0	1.1
Fortified wine	33	6.6	0.9	0.2
Sparkling wine	8	1.2	0.2	0.03
Ready-to-drink (alcoholic fruit beverages plus spirit coolers)	430	25.8	12.1	0.7
Spirits	79	34.1	2.2	1.0
Total (absolute alcohol)		258.7		7.3

Notes: This table refers only to recorded (i.e. tax-paid) alcohol. The per capita figures are based on the population aged 15 and older (35.47 million). Sources: Budget Review, 2013/14; SAWIS, 2013.

4. TRENDS IN ALCOHOL TAXATION

Like cigarettes and other tobacco products, alcohol products are subject to a specific excise tax. A specific excise tax is one where the tax is levied on the quantity of the product, rather than the value of the product. In contrast, an ad valorem tax is imposed on the value of the product. From a tax administration perspective, a specific tax is much simpler than an ad valorem tax. The tax liability under a specific tax regime is simply the quantity (or volume) of the product, multiplied by the rate per unit. In contrast, in order to determine the tax liability for an ad valorem excise tax, the revenue authorities need to know the value of the product, and apply the appropriate percentage. Calculating the value is more complex than simply counting or measuring the product. Also, through a variety of means (e.g. transfer pricing) firms can attempt to reduce their tax liability by reporting a lower base value than would have been the case had an ad valorem tax not been imposed.

Much has been written about the optimal tax system for *tobacco products* and the consensus is that a specific tax is superior to an ad valorem tax (WHO, 2010, Van Walbeek, 2010). Other than the fact that a specific tax is superior in determining the total tax liability, it has the advantage that it tends to compress retail prices of the product on which it is levied. In the context of cigarettes, a specific tax of R10.92 per pack (which is the rate at which cigarettes are taxed in the 2013/14 financial year) implies that cigarettes would have to be sold at a price of at least R12.45 (i.e. R10.92 plus R1.53 VAT) to cover the tax burden. Had the excise tax been levied as an ad valorem tax, the tax amount would decrease as the base amount is decreased. In highly competitive environments (e.g. a new firm wanting to break into the market or a price war among incumbents) firms could drop the base value to very low levels. The result is that the Treasury effectively subsidises the low price products. The industry would charge high prices for premium product, and pay a relatively high absolute excise tax amount, but would have the incentive to charge very low prices for product aimed at the low end of the market, and, by implication, pay a small amount of excise tax on such product. Poor smokers typically smoke low-price cigarettes and are likely to be much more price sensitive than richer smokers.

Currently the excise tax on traditional beer, wine (including fortified and sparkling wine), ciders and flavoured alcoholic beverages is levied as an amount per unit of the beverage. Thus, even though the alcohol content differs for say, two different kinds of white wine, the excise tax per bottle is the same. The primary reason for imposing the tax on the volume of the actual beverage, rather than the volume of absolute alcohol, is practical (Riaan Labuschagne, personal communication). Wine is produced by very many small (and some large) firms, and it would be impractical to audit all firms for the alcohol content for the various wines that are produced.

For beer and spirits the excise tax is levied per unit of absolute alcohol. Thus a given quantity of beer that has higher alcohol content would be subject to a higher excise amount than beer with lower alcohol content. The rate at which the excise tax is imposed is adjusted by the Minister of Finance each year in February at the reading of the Budget.

The economic rationale for levying an excise tax on the volume of absolute alcohol is more obvious than for levying an excise tax on the volume of the beverage, irrespective of the alcohol content. The negative externalities associated with the harmful use of alcohol are more correlated with the volume of absolute alcohol than with the volume of the beverages themselves. Beer with 6% alcohol content, for example, has greater potential to impose harm on the drinker and impose a negative externality, than beer with a 1% or 2% alcohol content. They should not be taxed at the same rate. In the 2013/14 financial year a 330 ml can beer with 6% alcohol is subject to an excise tax of R1.26, whereas a 330 ml can of low-alcohol beer (2%) is subject to an excise tax of R0.42. The Department of Finance's decision in 1974 to tax spirits on the basis of absolute alcohol, and the Treasury's decision in 1998 to extend this to beer, is justified on economic grounds.

Ideally the same principle should apply to sorghum beer and wine and other fermented products as well. For sorghum beer the excise tax is so low (see below) that it does not make much of a difference on what base the product is taxed. For the wine industry the practicalities of the industry (specifically the dispersed nature of the industry and the large and often heterogeneous variety of wines that are produced by individual producers) are such that this is not feasible.

Table 2 provides a summary of excise taxes levied on different categories of alcoholic beverages, for the 2013/14 financial year.

TABLE 2: EXCISE TAXES LEVIED ON ALCOHOL, 2013/14

PRODUCT	EXCISE DUTY RATE	BASE
Malt beer	R63.81	Litre of absolute alcohol
Traditional African beer	7.82 cents	Litre
Traditional African beer powder	34.70 cents	Kilogram
Unfortified (i.e. natural) wine	R2.70	Litre
Fortified wine	R4.85	Litre
Sparkling wine	R8.28	Litre
Ciders and flavoured alcoholic beverages	R3.19	Litre
Spirits	R122.80	Litre of absolute alcohol

Source: http://www.treasury.gov.za/documents/national%20budget/2013/review/chapter%204.pdf

At less than 8 cents per litre, traditional African beer (i.e. sorghum beer) is subject to the lowest excise tax by far. The rationale for this, expanded on below, is that the consumers of this beverage (mainly poor, rural Africans) are very price sensitive and can easily substitute to home brews and other concoctions. Commercially brewed sorghum beer has been in long-term decline and presumably the Treasury does not want to add to this industry's woes by raising the excise tax further.

The excise tax on wine is levied at R2.70 per litre of wine. This equates to R20-R25 per litre of absolute alcohol for most natural wines, which is substantially lower than the excise tax levied on beer and spirits. That wine is subject to a substantially lower excise tax than other categories presumably reflects the important role that wine production plays as a source of employment, especially in the Western Cape. The fact that the government has made some fundamental policy changes and turnabouts in its wine taxation policy in the past 70 years indicates that this is a sensitive issue. Wine farmers and their many labourers and dependents are an important constituency, especially in the Western Cape.

If it can be shown that the negative externalities associated with the consumption of wine are less than the negative externalities associated with the consumption of beer or spirits (all expressed in absolute alcohol), then a lower excise tax on wine would be justified on economic grounds. However, anecdotal evidence from the Western Cape suggests that alcohol abuse is a major problem, especially in the agricultural communities, and that wine, rather than other categories of alcohol, is the beverage of choice for people who abuse alcohol.

Ciders and other flavoured alcohol beverages (FABs) are taxed at the rate of R3.19 per litre, irrespective of alcohol content. This equates to R1.08 per 340 ml can. This is also the excise tax levied on beer with 5% alcohol content. Given that the alcohol content of these ciders and FABs is often higher than 5%, the excise tax on this category of beverage is lower than that of beer. Ciders and FABs are particularly popular among the youth and prevalence of use has increased very rapidly in the past 12 years (see Chapter 2). These beverages are often "entry beverages" to under-age youth. The fact that they are subject to such low excise taxes should be seen as problematic from a public health and societal perspective.

In 2002 the National Treasury published an influential paper that still forms the foundation of South Africa's excise tax policy towards alcohol (SA National Treasury, 2002). It acknowledged the role that increased taxes on alcohol could play in reducing alcohol abuse, but also acknowledged the economic role of the alcohol industry. It recommended that the excise tax be set such that the total tax burden (i.e. excise tax plus VAT), as a percentage of the weighted average retail selling price, would be 33% for clear beer, 23% for wine, and 43% for spirits. Furthermore, annual adjustments in the excise tax would be based on the increase in the weighted average price of the alcohol categories in question, or the expected consumer inflation rate, whichever is the higher (SA National Treasury, 2002). In 2012 the targeted tax burden on beer was increased to 35%, and on spirits to 48%. The targeted tax burden on wine remained the same at 23%.

Even though the excise tax on alcohol is levied as a specific tax, the chosen excise tax regime has characteristics of an ad valorem system. The alcohol industry has a degree of control over the magnitude of the annual increase in the excise tax. For example, should SAB increase the net-of-tax price of beer by an above-inflation percentage, this would result in an above-inflation increase in the weighted average retail price of beer. In the subsequent fiscal year the Treasury would then increase the excise tax on beer by an above-inflation percentage in order to maintain the 33% (or, since 2012, the 35%) total tax burden. On the other hand, had SAB decided to increase the nominal price of beer by less than the inflation rate, the increase in the excise tax the following year would be equal to the expected inflation rate. A below-inflation increase in the net-of-tax price, combined with an increase in the excise tax equal to the (expected) inflation rate, would thus increase the total tax burden to more than the benchmark 33% (35% since 2012).[2] Unless driven by competitive reasons, it would not be in the alcohol industry's financial interests to increase the net-of-tax price by less than the inflation rate. As will be shown in a subsequent chapter, the real price of alcohol has increased over the past decade, presumably in response to the excise tax regime, as well as to the fact that the market power of large alcohol producers, especially in the beer and spirits sectors, allowed them to increase the net-of-tax price at rates in excess of the inflation rate.

The excise tax model that was suggested for alcohol in 2002 has many things in common with the excise tax model that has been applied to tobacco products. In 1994 the government announced that it wished to increase the tax burden on cigarettes to 50% of the retail price, to be phased in over a number of years. The total tax burden at the time was about 34% (of which 22% was excise tax and 12.3% was the VAT component of the VAT-included price). The stated intention of the tax increase was to reduce tobacco use. Very substantial increases in the excise tax followed, and in 1997 the Minister of Finance announced that the 50% target had been achieved. Given the highly concentrated nature of the cigarette manufacturing market, the main player, British America Tobacco, was able to increase the net-of-tax price of cigarettes substantially on a consistent basis for many years (until about 2010 at least). This resulted in a cycle of net-of-tax price increases, retail price increases and excise tax increases, where the excise tax was passively increased by the Treasury in order to maintain the 50% tax burden. In 2004 the Treasury increased the total tax burden on cigarettes from 50% to 52% of the most popular price category (MPPC).

The excise tax regimes on both tobacco and alcohol provide a high degree of predictability, both for the respective industries and for the Treasury, as to the nominal increase in the excise tax in the following year. Given this predictability, the need for the Treasury to negotiate future excise tax increases with the respective industries falls away. The calculation of the excise tax increase is a fairly simple mathematical calculation. The drawback of this way of determining the increase in the excise tax is that it places too much power in the hands of industry. Their pricing decisions have a direct impact on the magnitude of the increase in the excise tax.

[2] However, as pointed out in Chapter 4, the effective total tax burden is currently less than the targeted 35%.

The Treasury's 2002 report was part of a process of simplification and rationalisation of the excise tax regime on alcohol that had been taking place in the previous ten years. In previous decades the government had allowed many peculiarities and complexities to creep into the excise tax system, some of which will be briefly mentioned here. Currently the different types of spirits (e.g. brandy, whisky, cane and rum) are taxed at the same rate (i.e. R122.80 per litre of absolute alcohol in the 2013/14 financial year). Before 1998 the government levied excise taxes at differential rates on wine spirits (e.g. brandy), "distillations of any sugar cane products" (e.g. cane and vodka), and "distillations of any grain products" (e.g. whisky), with wine spirits carrying the lowest tax and "distillations of any grain products" carrying the highest tax, even though the alcohol content on all products was similar.

The current excise tax regime on spirits has the advantage of simplicity, but producers of the cheaper types of spirits (e.g. brandy) complain that their effective excise tax burden is higher than that of the generally more expensive type of spirits (e.g. whisky) (Riaan Labuschagne, personal communication). As an observation of fact, that is correct. Whisky is generally more expensive than brandy, as will be shown in Chapter 4, and thus carries a lower tax burden. The National Treasury is regularly lobbied by the producers of brandy to impose a differentiated excise tax, such that the playing field, in terms of total tax burden, between the various spirits subcategories is more equal (Riaan Labuschagne, personal communication).

Whether the National Treasury should agree to this request depends largely on what it aims to achieve with the excise taxes. For example, if the primary aim of the excise tax is to raise revenue, the Treasury should raise the excise tax, since the international literature (Chapter 7) and the South African data (Chapter 8) clearly show that the demand for alcohol is price inelastic. Ramsey's law would then suggest that the Treasury should levy the highest taxes on those products whose price elasticity of demand is lowest (in absolute terms) and levy a lower tax on more price elastic products.

If the Treasury's aim is more nuanced, for example, if the tax is levied to counteract the harmful effects of alcohol abuse, the tax should be a positive function of the harm caused by that particular commodity, holding all other factors constant. For example, if it could be shown that the harm per unit of whisky consumed is greater than the harm per unit of brandy consumed, that would create an economic rationale (based on the negative externality argument) to impose a higher absolute amount of excise tax on whisky, relative to brandy. On the other hand, if it were shown that the harm caused by a unit of brandy is greater than the harm caused by a unit of whisky, this would suggest a higher absolute excise tax on brandy, relative to whisky, even though the retail price (and thus the net-of-tax price) of brandy is less than that of whisky. We are not aware of studies that have investigated the social harm associated with different subcategories of spirits. At an intuitive level, however, it seems unlikely that brandy imposes a smaller negative externality than whisky. Imposing a lower tax amount on brandy, simply because brandy is cheaper than whisky, would not be justified on economic grounds. Also, should the Treasury succumb to the requests of the brandy producers and tax brandy at a different rate to other spirits, the Treasury would lose the simplicity that it has introduced over the past decades.

When excise taxes on wine were introduced in 1942, they were initially only levied on fortified and sparkling wine; natural wine was exempted. In 1962 a uniform excise tax on natural wine was introduced at 15 cents per gallon. This was changed in the subsequent year to 6 cents per gallon for the cheapest wine, 12 cents per gallon for better wines and 18 cents per gallon for superior wine. The net effect was a substantial reduction in the weighted average excise tax on wine. The differential excise tax system on natural wine was abolished in 1967. The government allowed inflation to erode the real value of the excise tax and in 1982 the excise tax on natural wine was abolished. Only in 1992 was the tax on wine re-

introduced and the amount of the tax was based on the volume of wine, irrespective of the alcohol content or the value (or price) of the product.

The real excise tax on beer and spirits, per litre of absolute alcohol, for the period 1960-2013, is shown in Figure 3.[3] The real excise tax on cigarettes over the same period is shown on the secondary axis. The Consumer Price Index has been used to deflate the price data.

If one considers the period after 1990, it is evident that the real excise tax on alcohol has increased: between 1990 and 2013 the real excise tax on beer increased by 32% (average of 1.2% per year), and the real excise tax on spirits increased by 87% (average of 2.7% per year). In contrast, the excise tax on cigarettes increased by 459% (7.8% per year) over the same period.

While most analyses (cf. SA National Treasury, 2002) tend to focus on relatively short periods (usually not more than 10 years), we present consistent data going back to 1960. In the 1960s and 1970s the excise taxes on beer and spirits were much higher than they are at present. In fact, at its peak in the late 1960s, the value of the excise tax on beer, in real terms, was more than three times the current value of excise tax. The real value of the excise tax on spirits in the 1970s was nearly double current levels. Industry bodies that complain that the excise tax is "too high" and has been increasing "rapidly" over the past years should place the current level of the excise tax in the appropriate historical perspective.

By way of contrast, the real excise tax on cigarettes has increased much more rapidly since the early 1990s. Cigarette excise taxes "peaked" in 1972, after which they decreased sharply. However, since the early 1990s, the real excise tax on cigarettes increased sharply, as part of the government's health agenda. In 2003 the real excise tax on cigarettes surpassed the 1972 "peak", and continued its sharp upward trend subsequently. In 2013 the excise tax on cigarettes is about 66% higher than its "peak" in 1972.

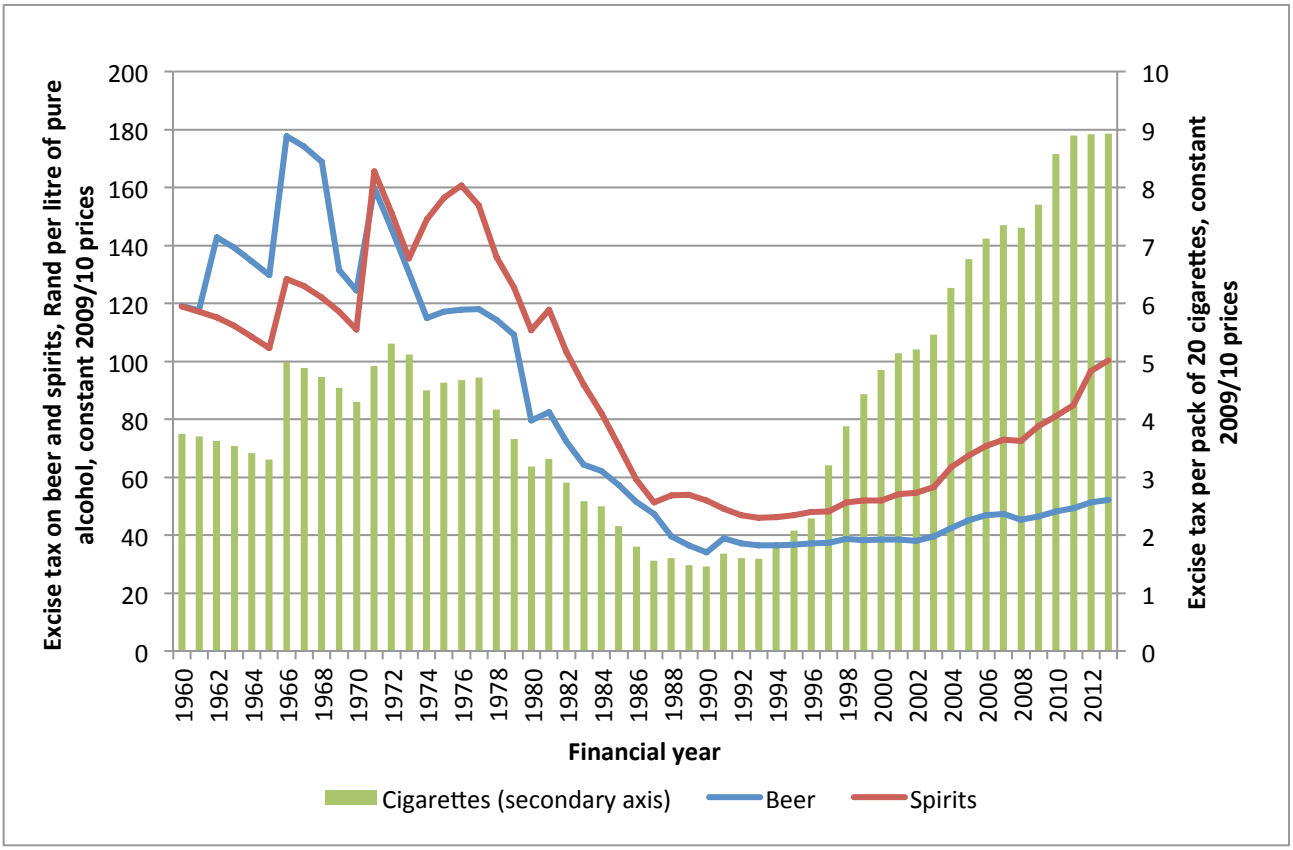
As discussed previously, the excise tax on both alcohol and tobacco is levied as a specific tax. In a low-inflation environment, as in the 1960s, this means that the real excise tax would slowly erode if the government does not adjust the nominal rate. Adjustments tend to be made only occasionally, and certainly not on an annual basis. For example, the sizeable increases in the nominal (and real) excise tax on alcohol and tobacco in 1966 and 1971 indicate that the government wanted to "make up" what it lost in previous years. However, in the high-inflation 1970s and especially the 1980s, the government rarely increased the nominal excise tax and the result was that inflation decimated the real value of the excise tax. Between 1980 and 1990 the real excise tax on spirits decreased by 53% (average of 7.3% per year), and the real excise tax on beer by 57% (average of 8.2% per year). The excise tax on wine (not shown) decreased not only in real terms, but also in nominal terms, and was temporarily abolished in 1982.

By way of comparison, between 1980 and 1990 the real excise tax on cigarettes decreased by 54% (average of 7.5% per year). Cigarette excise taxes decreased at broadly the same rate as the excise tax on beer and spirits. The Minister of Finance increased the nominal excise tax on cigarettes by very modest amounts on a number of occasions, but this was not nearly enough to make up for the high inflation in that decade. As a result of this neglect, both alcohol and cigarettes became more affordable, and consumption of both commodities rose.

[3] Before 1998 the excise tax on beer was levied on the volume of beer, rather than on the volume of absolute alcohol. The excise tax on volume of beer was converted to volume of pure alcohol, assuming a 5% average alcohol content. Similarly, we converted the volume of spirits into volume of absolute alcohol assuming a 43% alcohol content. Also, in the period when different types of spirits were subject to different excise tax amounts, we used the excise tax on brandy as the most representative of spirits.

Firms, and bodies that represent firms, typically focus on the short run, and do not have the institutional memory, or the interest, to take a truly long-run view of variables of interest. If one considers the excise tax on beer and spirits since 1990, there has been a clear upward trend. However, such an analysis would hide the fact that, during the 1960s and 1970s, the real excise tax had been substantially higher. Should the industry complain about the increase in the excise tax over the past two decades, the high rates of the 1960s and 1970s, and the sharp decrease in the real excise tax in the late 1970 and throughout the 1980s should not be forgotten.

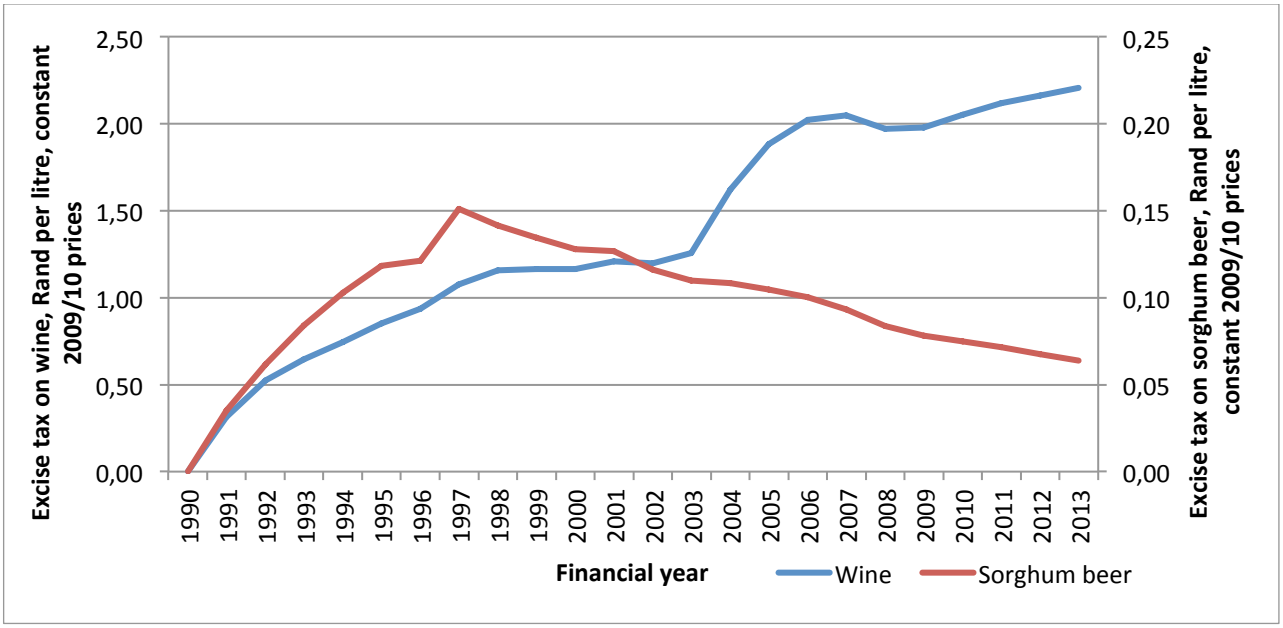
FIGURE 3: *REAL EXCISE TAX ON BEER, SPIRITS AND CIGARETTES, 1960-2013*



After having been abolished in 1982, excise tax on wine was re-introduced in 1991. It was levied on the volume of wine, rather than on the volume of absolute alcohol. The tax was introduced at a modest (nominal) 9 cents per litre and was increased in both nominal and real terms in each subsequent year for more than 15 years. The real tax decreased slightly in 2008, but has been increasing at a modest rate in the past five years. See Figure 4.

Excise taxes on sorghum beer (called traditional African beer in Treasury documents) were also introduced in 1991. It was introduced at a rate of 1 cent per litre. The nominal excise tax was increased regularly between 1992 and 1997, and was increased once more in 2001, but since then the nominal rate has remained unchanged at 7.82 cents per litre. As a result, the real excise tax on sorghum beer has decreased by about 60% from its peak in 1997. See Figure 4, but please note that the scale on the secondary Y-axis is one tenth of the scale on the primary Y-axis. Commercially produced sorghum beer and home-brewed sorghum beer are very close substitutes. Since sorghum beer is consumed mainly by poor (and thus price sensitive) African households, the Treasury warned against increasing the excise tax on sorghum beer (SA Treasury, 2002: 22). Furthermore, the Treasury indicated that an increase in the tax on sorghum beer is likely to switch some consumers to brew much more dangerous and potent concoctions (SA Treasury, 2002: 23).

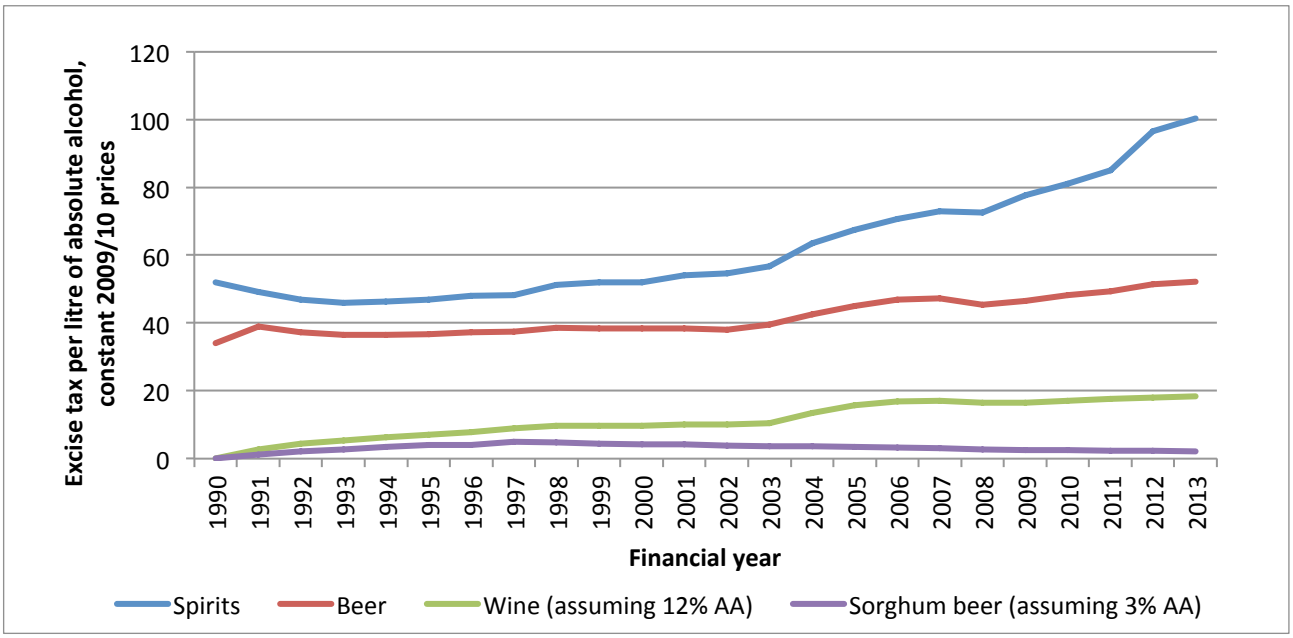
FIGURE 4: REAL EXCISE TAX ON WINE AND SORGHUM BEER, 1990-2013



Sources: Budget Review, various years; Budget speeches, various years

Alcohol in South Africa is taxed at widely differing rates, depending on the category. Trends in real excise tax for four major categories of alcohol, i.e. spirits, beer, wine and sorghum beer, are shown in Figure 5 for the period 1990 to 2013. The excise tax is expressed as the rand value per litre of absolute alcohol. For wine we assumed an average alcohol content of 12% while for sorghum beer we assumed an average alcohol content of 3%. As is the case in most countries, spirits are subject to the highest excise tax, and have been subject since 2000 to the largest excise increases. The excise tax on the absolute alcohol in beer is currently just more than half (52%) that of spirits, while the excise tax on the absolute alcohol in wine is 18.3% that of spirits. The excise tax on the absolute alcohol on sorghum beer is 2.1% that of spirits. Since 2000 there has been a widening in the excise tax "dispersion" between the various categories. Expressed as a percentage of the excise tax on the absolute alcohol in spirits, the absolute alcohol in beer was taxed at 73.8% in 2000. The absolute alcohol in wine was taxed at 18.7% of the rate at which spirits were taxed, and the absolute alcohol in sorghum beer was taxed at 8.2% of the rate at which spirits were taxed in 2000.

FIGURE 5: REAL EXCISE TAX ON FOUR CATEGORIES OF ALCOHOL



5. TRENDS IN ALCOHOL TAX REVENUE

The Treasury classifies excise taxes under "domestic taxes on goods and services", together with, amongst others, Value-added Tax, the fuel levy and, since 2000, the air departure tax. The Treasury distinguishes between specific excise duties and ad valorem excise duties. Specific excise duties are levied primarily on alcohol, tobacco and petroleum products (the latter not to be confused with the fuel levy, which is reported on separately).

Table 3 indicates the relative importance of excise taxes on alcohol and tobacco products for a number of selected years in the past 20 years. Between 1995 and 2000 the contribution to total revenue from alcohol decreased from 2.3% to about 1.8%, and it has remained broadly constant since then at about 1.7%. On the other hand, the relative share of tobacco excise tax increased quite sharply from 1.22% in 1995 to 1.78% in 2000.[4] This was of course due to the sharp increases in the excise tax during that period. Since 2000 the relative contribution of tobacco taxes has decreased. The relatively modest increases in the excise tax, together with more rapid increases in other sources of government revenue, are primarily responsible.

TABLE 3: EXCISE TAX REVENUE FROM ALCOHOL AND TOBACCO AS A PERCENTAGE OF TOTAL GOVERNMENT GROSS REVENUE, SELECTED YEARS

FINANCIAL YEAR	BEER	SORGHUM BEER	WINE	SPIRITS	TOTAL ALCOHOL	CIGARETTES & CIG TOBACCO	TOTAL TOBACCO
1995	1.58	0.03	0.15	0.53	2.29	1.19	1.22
2000	1.17	0.02	0.20	0.39	1.78	1.65	1.78
2005	1.06	0.01	0.20	0.39	1.66	1.44	1.53
2010	1.04	0.01	0.22	0.42	1.69	1.39	1.46
2013*	1.02	0.00	0.24	0.48	1.75	1.40	1.49

** Budgeted numbers*

The relative contributions of the different alcohol categories for the 2012 financial year are presented in Figure 6. Despite the sizeable decrease in the relative share since 1995, as indicated in Table 3 above, beer is still by far the largest contributor to total alcohol excise revenue (59%). Sorghum beer's contribution is negligible, but spirits and wine contribute 27% and 14% of total alcohol excise revenue, respectively.

[4] The difference between "total tobacco" and "cigarettes and cigarette tobacco" is "pipe tobacco and cigars". The latter are not shown in the table.

FIGURE 6: RELATIVE CONTRIBUTIONS OF ALCOHOL CATEGORIES TO TOTAL ALCOHOL EXCISE REVENUE, 2012 FINANCIAL YEAR

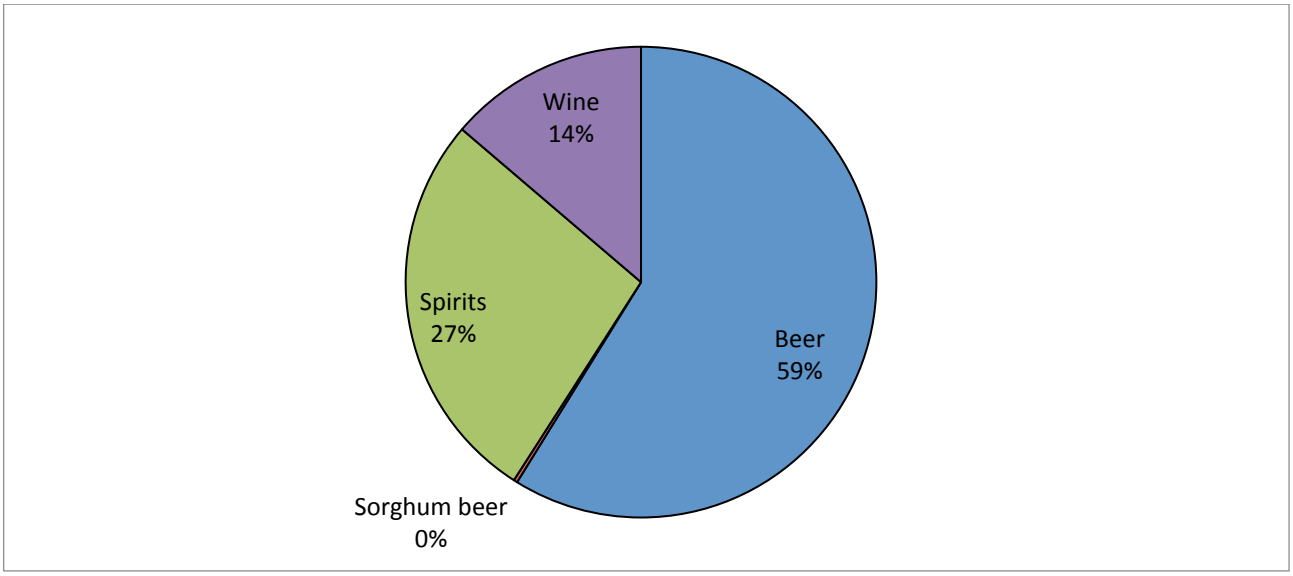


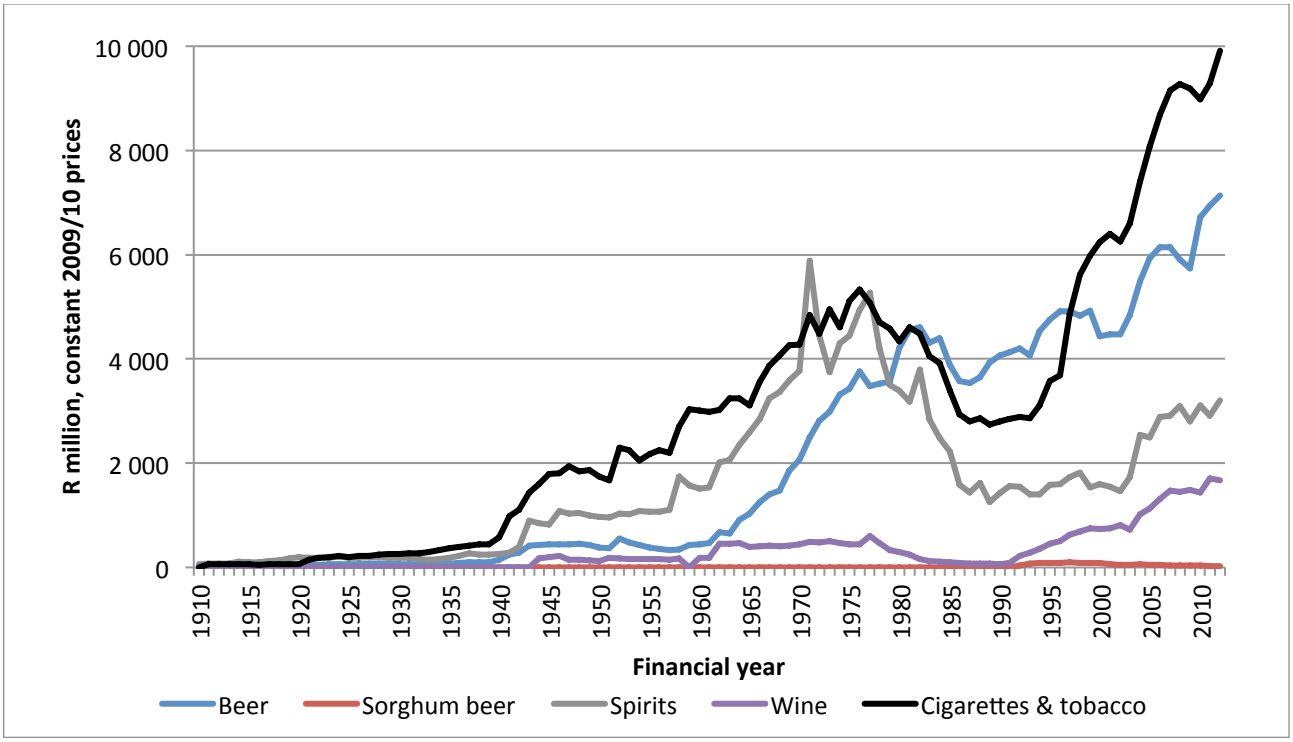
Table 3 (previous page) considers the *relative* contribution of alcohol and tobacco excise taxes for a number of years. Figure 7 (following page) considers the real value of the four categories of alcohol, as well as cigarettes, for 1910 to 2012. The nominal revenue numbers were obtained from individual reports of the Auditor-General, and since the mid-1990s, from the Budget Reviews. The revenue numbers were deflated by the Consumer Price Index.

Although excise taxes on beer and spirits (and tobacco) have been levied since at least the formation of the Union in 1910, it was not until World War II that the government started raising substantial revenues from this source. From the early 1940s to the late 1970s, revenue from excise taxes on spirits exceeded the revenue received from all other alcohol products, often significantly so. The rapid growth in the real excise revenue of spirits since 1940 was driven primarily by a rapid growth in consumption. In 1940, the total consumption of spirits was about 2 million litres of absolute alcohol. The 10 million litre mark was passed in 1958 and consumption peaked at more than 30 million litres in the early 1970s. It has been broadly flat since then. The dramatic fall in real excise tax revenue from spirits in the 1980s was caused by the sharp fall in the real excise tax per unit during that period, as discussed in the previous section. The increase in spirits' excise tax revenue since the early 1990s is primarily due to the increase in the real excise tax per unit and to a lesser extent to a modest increase in consumption.

Excise tax revenue from beer has a very different time profile to that of excise tax revenue from spirits. Excise tax revenues from beer were negligible before World War II. They increased during the war, but remained fairly low until the early 1960s, when there was dramatic growth. Like spirits, the growth in excise tax revenues from beer during this period was driven primarily by volume (see Figure 1). Excise tax revenue from beer dropped slightly during the 1980s, but the rapid growth in consumption largely offset the sharp decrease in the real excise tax per unit. The growth in excise revenue since 1990 is a combination of an increase in total beer consumption and an increase in the excise tax per unit of beer, broadly in equal proportions.

Since the reintroduction of the excise tax on wine, there has been a sharp increase in real revenues from "wine and other fermented products" (represented by the "wine" line in Figure 7). The analysis of SAWIS shows that consumption of wine has remained fairly constant over the past 12 years, and may have even decreased somewhat, but the consumption of flavoured alcoholic beverages has increased sharply. The growth in these fashionable beverages seems to be driving the increase in excise revenue in this category.

FIGURE 7: *REAL EXCISE TAX REVENUE ON ALCOHOL AND TOBACCO PRODUCTS, 1910-2012*



Sources: Auditor-General Report, various issues; Budget Review, various issues; Statistics South Africa.

Total tax revenue is the mathematical product of (legal) consumption and the excise tax per unit. Increasing total revenue can be done in one of three ways: (1) increase aggregate consumption, (2) increase the excise tax or (3) a combination of the two. Between World War II and the 1970s, spirits sales experienced a strong growth phase. Similarly, beer's strong growth phase was between 1960 and the mid-1990s. Flavoured alcoholic beverages have also experienced a very rapid growth phase since the 1990s. Cigarettes experienced a rapid growth phase between World War II and the 1980s. For a government that wishes to increase its revenues, excisable products that are experiencing rapid sales growth are a boon.

In time, products mature or become the target of interventions by policy makers. If they are regarded as socially undesirable, or, at the minimum, perceived as imposing large negative externalities on society, they could easily become targets of policy intervention as discussed in Chapter 5.

Beer, spirits, commercially produced sorghum beer, wine and cigarettes would be classified as mature products. Per capita consumption (and even aggregate consumption in some cases) has been falling. A government that wishes to increase excise tax revenues cannot depend on increases in consumption (it would typically not want to increase consumption in any case), but would have actively to raise the excise tax per unit, should it desire to raise additional revenues.

Cigarettes are a good example of a mature product that yielded substantially more revenue for government after the government actively raised the excise tax. South Africa, following the lead of many high-income countries and some middle-income countries, in 1994 identified tobacco as a target of active policy intervention. This was driven primarily by a health agenda, but the fiscal situation at the time was so serious that the additional revenue was genuinely needed. Through a combination of legislative restrictions and tax increases, the Ministries of Health and Finance have dramatically changed the tobacco landscape in South Africa. Between the early 1990s and 2012, the government raised the real excise tax more than five-fold. The result was a one-third reduction in aggregate cigarette consumption and, on the other hand, a more than 250% increase in real excise revenue from this source.

6. BUDGETED AND ACTUAL REVENUES

If given a choice, governments, like most individuals, would prefer stable income sources to erratic and difficult-to-predict income sources. Furthermore, governments prefer income sources that are less prone to sudden and unexpected decreases in revenue, should the economy slow down or go into recession, for example.

The aim of this section is to analyse how successful the officials at the Treasury were at budgeting excise tax revenues for alcohol, and to compare their "budgeting errors" with the "budgeting errors" of some other important tax sources. Through this analysis, one can create an ex post picture of the relative ease or difficulty in budgeting for revenue.

This type of analysis was initially performed in the context of tobacco taxation (Van Walbeek, 2013). The tobacco industry argued that illicit trade in tobacco products is so problematic that it undermines government revenue. If that were true, we would expect two things: (1) actual tobacco excise revenue to be substantially less than budgeted revenue and (2) deviations from budgeted revenue to become increasingly larger. The first point is obvious. The second point derives from the fact that if illicit trade becomes seriously problematic, officials at the Treasury may try to "account" for the illicit trade by reducing the budgeted revenue, not because of economic factors (e.g. income changes or tax rate changes), but because of the increase in illicit trade. The budgeted revenue then becomes more a guess than a number based on careful economic analysis, and is likely to be less accurate than it would have been had the budget been based on careful economic analysis only.

As with tobacco, the illicit trade in alcohol is often presented as an important issue for government. Typically, when an increase in the excise tax is mooted, the first response by both the tobacco and alcohol industries is to argue that it is likely to increase the illicit market. Chapter 9 will deal with illicit alcohol in more detail. The aim of this section is to provide a basic statistical analysis of budgeted revenue and actual revenue for alcohol and tobacco excise taxes, and to compare it with the revenues obtained from Value-added Tax (VAT), income tax on individuals and corporate tax.

We use two summary statistics often used in analysing the accuracy of forecasts, namely the mean percentage error (MPE) and the mean absolute percentage error (MAPE). The MPE indicates whether forecasts/budgets are consistently too high or too low, compared to the outcome value. The MPE is defined as $\frac{1}{n}\sum_{i=1}^{n}\left[\frac{(A_i-B_i)}{B_i}\times 100\right]$ where A_i is actual tax revenue, B_i is budgeted tax revenue and n is the number of years for which the summary statistic is calculated. A negative or increasingly negative MPE value is consistent with an increase in illicit trade, and/or with a problematic tendency to overestimate the revenue.

Should illicit trade become structural, it seems reasonable that the Treasury would take the illicit trade into account and budget for lower legal (i.e. tax-paid) cigarette sales. Budgeting becomes more difficult and one would expect the deviations, on average, to become larger. The MAPE considers the absolute deviations from the budgeted tax revenue. The MAPE is defined as $\frac{1}{n}\sum_{i=1}^{n}\left[\frac{(|A_i-B_i|)}{B_i}\times 100\right]$. The MAPE is a measure of dispersion.

Using the Auditor-General's reports and the Budget Reviews, we collected data going back to either 1910 or to the year when the tax was implemented. We calculated the MPE and the MAPE for the pre-World War II period, and for 10-year periods after World War II. For the period after 2000 we calculated the MPE and MAPE for three periods: 2000-2012 (13 years), 2005-2012 (8 years) and 2009-2012 (4 years). Table 4 shows the MPEs, while Table 5 shows the MAPEs.

Considering the MPEs first (Table 4) one notices the following:

- In line with good budgeting practice, revenues have generally been above budget for most types of tax for the post-World War II period. This is especially true for the big sources of revenue (GST/VAT, tax on individuals and corporate tax), but also for beer and wine. Spirits revenue has been marginally below budget.
- For the period since 2000 (i.e. 2000-2012), the revenue from VAT, individuals and corporates have been comfortably above budget, but the revenue from alcohol, other than wine and other fermented beverages, has generally been below budget. The average percentage deviation for sorghum beer looks large (-8.4%), but given that revenues from this source are tiny, the absolute deviation is in fact small. The average deviations for beer (-3.1%) and spirits (-4.4%) suggest that the Treasury has budgeted for higher sales than actually occurred. In contrast, the actual revenue for wine and other fermented beverages was well above budget (6.3% on average). We do not have published budgeted numbers for the various sub-categories, but, based on the trends in prevalence presented in Chapter 2, it seems likely that the greater than expected growth in revenue is due primarily to the growth in the sales of ciders and other FABs.
- If we lump all four reported categories of alcohol together, the resulting actual revenue from the "all alcohol" category is 2.9% below budget for the 2000-2012 period. This compares relatively poorly with the average deviation for cigarettes and tobacco (-0.4%), VAT (+1.3%), income tax on individuals (+2.3%) and corporate tax (+7.0%).
- For the period 2009-2012, actual revenues of all tax sources have fallen short of the budgeted revenues. The recession of 2008/09, together with the sluggish recovery and the disappointing growth in 2011 and 2012, is primarily responsible for this unfortunate state of affairs. However, beer and spirits have generally performed better than in earlier years.

  Actual revenue from beer is only 0.9% less than budgeted for the 2009-2012 period, compared to 3.1% less than budget for the 2000-2012 period. Similarly, for spirits, the shortfall from budget is only 1.0%, compared to a 4.4% shortfall for the 2000-2012 period as a whole. For all alcohol, the average deviation is -1.1% for the 2009-2012 period.

In Table 5 the mean *absolute* percentage deviations (MAPEs) are shown. These numbers are, by definition, higher than the MPEs presented in Table 4. For individual categories of alcohol the MAPEs tends to be higher than for "all alcohol". This indicates that positive deviations in one category of alcohol tend to offset negative deviations in other categories. In fact, for the post-World War II period the MAPE for "all alcohol" (4.9%) compares well with the MAPEs for any of the other major tax categories (cigarettes & tobacco 3.8%; GST/VAT 6.0%; income tax on individuals 6.8% and corporate tax 11.4%). For the 2000-2012 period, the MAPE for "all tobacco" (4.7%) compares well with the other tax categories, despite the fact that there are some large MAPEs for the four identified categories of alcohol.

Figure 8 presents annual percentage deviations from budget for three alcohol categories, and for "all alcohol", for the period 1990 to 2012.[5] The large deviations from budget for the various alcohol categories (especially wine and other fermented beverages) are easily seen, as well as the fact that the deviations often are in opposite directions, thus "flattening" the deviations for "all alcohol".

In Figure 9 the percentage deviations of "all alcohol" are shown against the percentage deviations of VAT, income tax on individuals and corporate tax. As one would expect, given the information provided in Table 6, the percentage deviations of "all alcohol" have similar statistical properties (i.e. mean and standard deviation) as the percentage deviations of the other revenue sources presented in that figure.

[5] We ignore sorghum beer because it is so small in absolute contribution.

FIGURE 8: *PERCENTAGE DEVIATIONS FROM BUDGET FOR THREE ALCOHOL CATEGORIES AND "ALL ALCOHOL"*

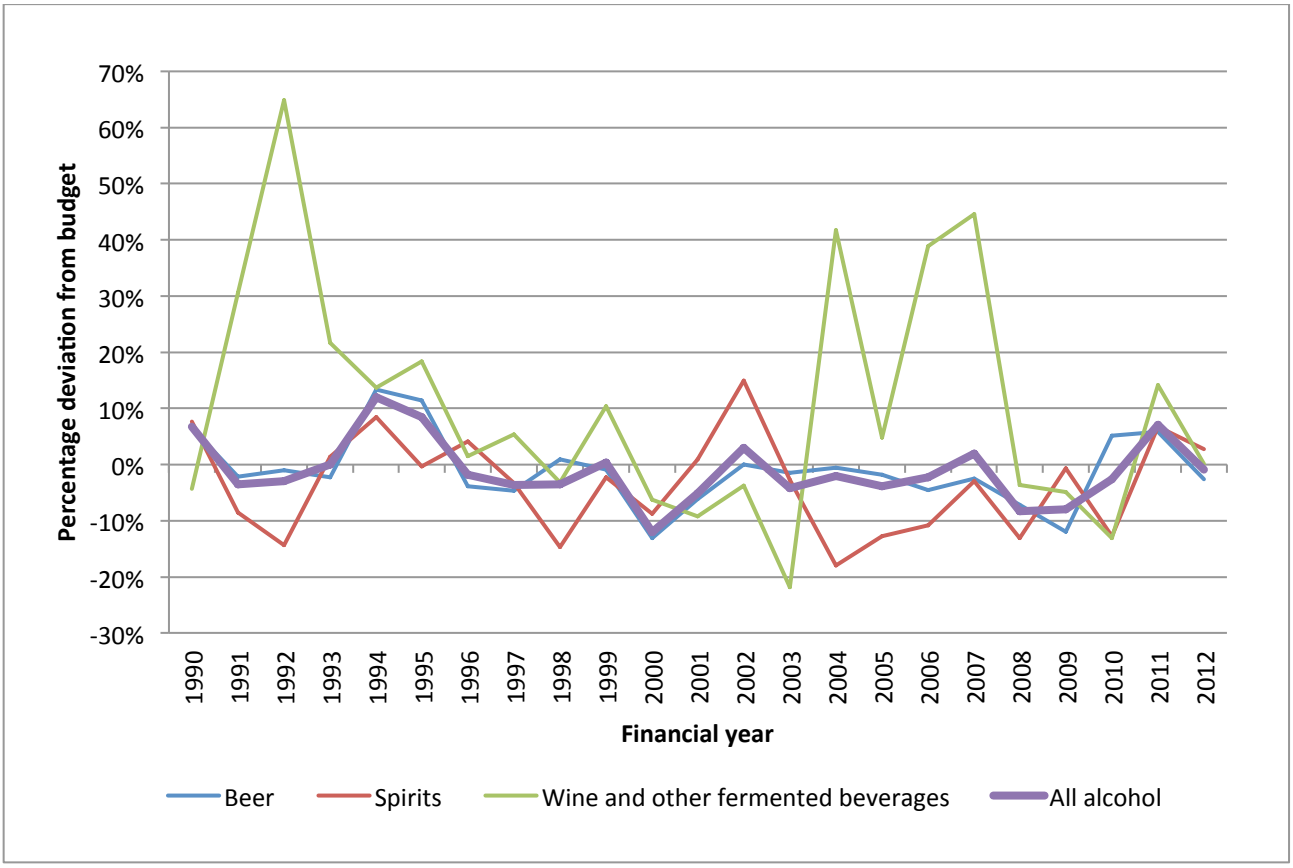


FIGURE 9: *PERCENTAGE DEVIATION FROM BUDGET OF "ALL ALCOHOL" AND THREE OTHER TAX REVENUE SOURCES*

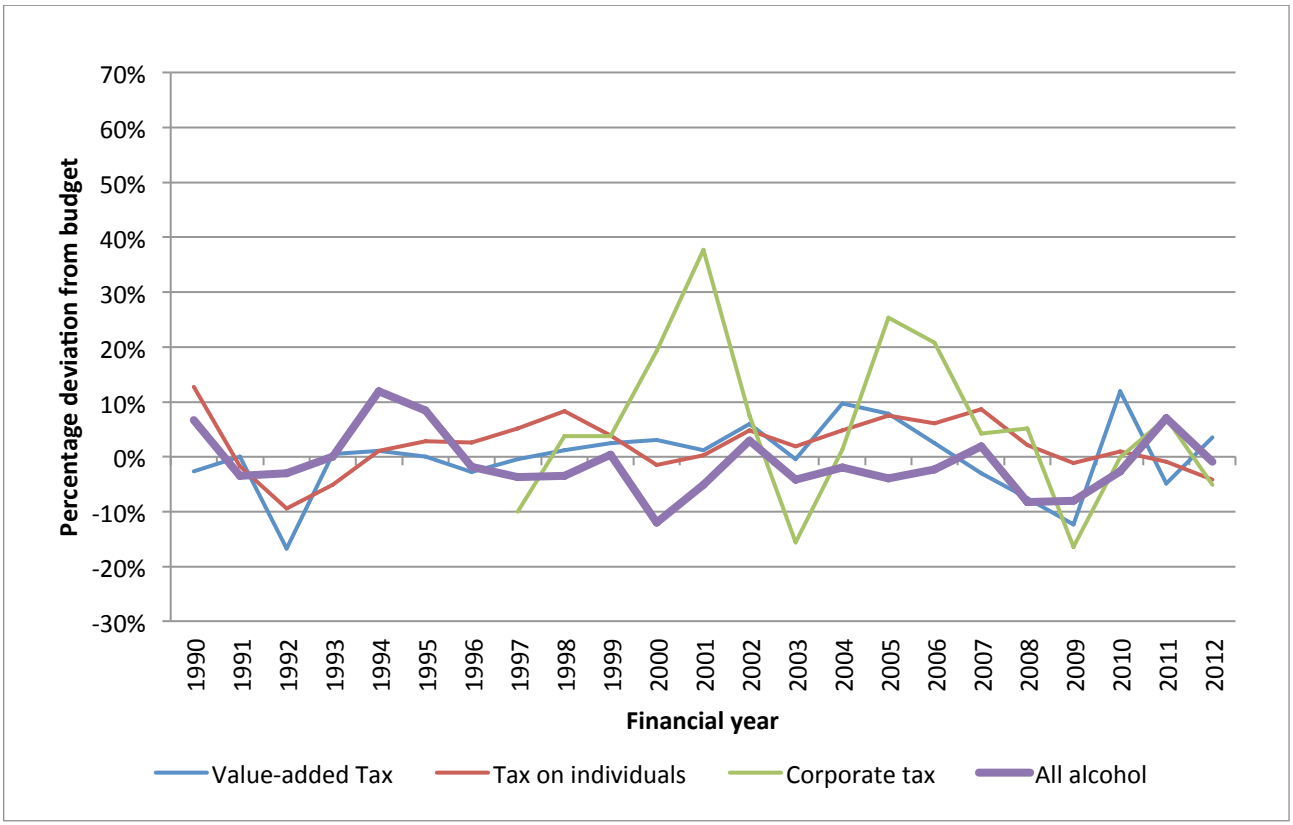


TABLE 4: AVERAGE PERCENTAGE DEVIATION FROM BUDGET [(ACTUAL - BUDGET)/BUDGET]

FINANCIAL YEARS	Number of Years	Beer	Sorghum Beer	Spirits	Wine & Fermented Beverages	All Alcohol	Cigarettes & Tobacco	GST & VAT	Tax on Individuals	Corporate Tax
1910-1945	36	4.8%		5.8%	17.9%	5.1%	10.6%		3.5%	
1946-2012	67	1.8%	-2.2%	-0.9%	3.6%	0.5%	-0.1%	2.0%	5.1%	5.5%
1946-1959	14	-1.1%		-1.0%	-3.4%	-1.6%	-0.9%		8.3%	
1960-1969	10	5.4%		3.9%	1.4%	3.6%	0.3%		8.2%	
1970-1979	10	4.3%		-1.2%	0.0%	0.9%	1.1%	28.9%	4.8%	
1980-1989	10	6.0%		0.8%	2.9%	3.4%	0.7%	1.1%	4.7%	
1990-1999	10	1.7%	7.8%	-2.2%	15.9%	1.2%	-0.9%	-1.7%	2.0%	-0.8%
2000-2012	13	-3.1%	-8.4%	-4.4%	6.3%	-2.9%	-0.4%	1.3%	2.3%	7.0%
2005-2012	8	-2.4%	-12.6%	-5.4%	10.1%	-2.1%	-2.1%	-0.3%	2.4%	5.1%
2009-2012	4	-0.9%	-20.5%	-1.0%	-0.9%	-1.1%	-5.6%	-0.5%	-1.3%	-3.7%

TABLE 5: AVERAGE ABSOLUTE PERCENTAGE DEVIATION FROM BUDGET [(ACTUAL - BUDGET)/BUDGET]

FINANCIAL YEARS	Number of Years	Beer	Sorghum Beer	Spirits	Wine & Fermented Beverages	All Alcohol	Cigarettes & Tobacco	GST & VAT	Tax on Individuals	Corporate Tax
1910-1945	36	12.5%		12.8%	17.9%	11.5%	14.0%		3.5%	
1946-2012	67	6.9%	18.4%	7.0%	11.1%	4.9%	3.8%	6.0%	6.8%	11.4%
1946-1959	14	6.5%		5.4%	9.7%	3.8%	3.5%		9.7%	
1960-1969	10	10.3%		4.1%	9.2%	3.6%	3.3%		8.2%	
1970-1979	10	9.3%		9.8%	5.1%	7.1%	3.7%	36.8%	7.2%	
1980-1989	10	6.6%		7.9%	8.1%	6.2%	2.8%	3.5%	7.2%	
1990-1999	10	4.7%	18.2%	6.5%	17.4%	4.3%	6.6%	2.8%	5.3%	5.9%
2000-2012	13	4.8%	18.5%	8.3%	15.9%	4.7%	3.4%	5.7%	3.5%	12.7%
2005-2012	8	5.2%	15.3%	7.8%	15.5%	4.4%	4.1%	6.7%	4.0%	10.5%
2009-2012	4	6.4%	20.5%	5.7%	8.1%	4.7%	5.6%	8.2%	1.8%	7.1%

TABLE 6: NUMBER OF OBSERVATIONS ON WHICH THE ANALYSIS IS BASED

FINANCIAL YEARS	Number of Years	Beer	Sorghum Beer	Spirits	Wine & Fermented Beverages	All Alcohol	Cigarettes & Tobacco	GST & VAT	Tax on Individuals	Corporate Tax
1910-1945	36	36	0	36	2	36	35	0	3	0
1946-2012	67	67	21	67	66	66	67	35	66	16
1946-1959	14	14	0	14	13	13	14	0	13	0
1960-1969	10	10	0	10	10	10	10	0	10	0
1970-1979	10	10	0	10	10	10	10	2	10	0
1980-1989	10	10	0	10	10	10	10	10	10	0
1990-1999	10	10	8	10	10	10	10	10	10	3
2000-2012	13	13	13	13	13	13	13	13	13	13
2005-2012	8	8	8	8	8	8	8	8	8	8
2009-2012	4	4	4	4	4	4	4	4	4	4

TABLE 7: PERCENTAGE OF YEARS WITH POSITIVE BUDGET DEVIATIONS (I.E. ACTUAL REVENUE > BUDGETED REVENUE)

FINANCIAL YEARS	Number of Years	Beer	Sorghum Beer	Spirits	Wine & Fermented Beverages	All Alcohol	Cigarettes & Tobacco	GST & VAT	Tax on Individuals	Corporate Tax
1910-1945	36	58%		67%	100%	69%	71%		100%	
1946-2012	67	52%	38%	55%	53%	53%	52%	57%	76%	69%
1946-1959	14	50%		57%	38%	31%	50%		92%	
1960-1969	10	70%		90%	60%	80%	60%		100%	
1970-1979	10	60%		60%	40%	80%	40%	50%	60%	
1980-1989	10	80%		60%	60%	70%	60%	60%	60%	
1990-1999	10	40%	38%	40%	80%	50%	40%	50%	70%	67%
2000-2012	13	23%	38%	31%	46%	23%	62%	62%	69%	69%
2005-2012	8	25%	25%	25%	63%	25%	38%	50%	63%	63%
2009-2012	4	50%	0%	50%	50%	25%	0%	50%	25%	25%

What are the main lessons learned from these data and the associated simple statistical analysis? The first is that there are substantial deviations from budget for the four categories of alcohol which are reported on by the Treasury. Whether this is the result of misclassification of the actual revenue (for example, excise tax on ciders being classified under spirits, rather than under wine and other fermented beverages) cannot be ascertained, and does seem rather unlikely. Nevertheless, the negative correlations between the deviations of the various alcohol categories do seem counterintuitive. One would expect shocks to the economy (e.g. a recession, or an unexpected growth spurt) to influence the various alcohol categories in broadly similar ways, such that deviations from budget are positively correlated.

A recent study (Van Walbeek, 2013) used the difference between the budgeted revenue and the actual revenue of tobacco products to evaluate the tobacco industry's claim that illicit trade in cigarettes was resulting in major revenue losses to the Treasury. His conclusion was that, until 2008, there was no evidence that the Treasury was losing significant amounts of money, and that actual revenues were in fact somewhat higher than budgeted revenue. However, a problem started developing in 2009 and reached its peak in 2010 and 2011, but subsided partially in 2012.

The fact that actual alcohol revenue was about 3% below budget between 2000 and 2012 could suggest, but certainly does not prove, that there was an illicit trade problem in those years (see Chapter 9). If one wants to believe this interpretation, one would also have to believe that the problem has stabilised in the past four years (2009-2012), given that the deviation from budget has reduced to about -1%.

As pointed out by Van Walbeek (2013), in order to estimate changes in the size of the illicit market by comparing actual changes in revenue to budgeted changes in revenue, one would have to show that the demand for the product is stable (i.e. that the quantity consumed can be predicted quite accurately with well-founded economic variables like the real price and income), and that the Treasury have budgeted for revenue using a consistent and economically justified methodology.

We have not investigated these aspects in this study. We would therefore be hesitant to say anything based on the analysis performed in this section about trends in the illicit trade in alcohol.

7. CONCLUSION

The aim of this chapter was to provide a long-run historical overview of trends in the consumption of the most important alcoholic beverages consumed in South Africa, as well as trends in two aspects of particular importance to the Treasury, namely the excise tax and excise revenue. Where relevant, all variables have been converted to real terms.

The most important conclusions are the following:

- Over the past century, consumption of alcohol has increased sharply, but has stabilised in the past two decades. Beer consumption increased very sharply between the 1960s and 1990s and has stabilised since then. The consumption of spirits increased sharply till the early 1970s, but has stagnated subsequently.

- Excise tax on sorghum beer was only introduced in 1992 and thus it was impossible to obtain consistent estimates of legal sorghum beer production before that time. However, the quantity of commercially brewed sorghum beer has decreased sharply since 1992, despite the fact that the excise tax is low, and has decreased sharply in real terms since about 2000.

- It is not possible to obtain data about wine consumption from excise tax revenue data because the Treasury groups the revenue from other fermented beverages with that of wine. However, data from a not-for-profit industry organisation suggests that aggregate wine consumption has remained broadly stable since the mid-1990s, but that per capita consumption has decreased over that period.

- The real excise tax on spirits has increased by more than 100% since the early 1990s, while the real excise tax on beer has increased by slightly more than 50% in the same period. Despite these substantial increases in the excise tax in the past 20 years, the real excise tax on spirits and beer in 2012 is substantially lower than at its peak in the 1960s and early 1970s. The government allowed inflation to erode the real value of the excise tax on alcohol by more than 70% during the 1970s and 1980s. The subsequent increases in the real excise tax have not made up the loss. By contrast, the real excise tax on cigarettes in 2012 was about 66% higher than at its peak in the 1970s.

- Excise tax revenues from alcohol have increased over the past 20 years. This has been driven primarily by increases in the excise tax per unit. However, in comparison to the increase in tobacco tax revenue over the past 20 years, the increase in alcohol tax revenue has been modest.

- Other than the flavoured alcoholic beverages (FABs), which have been growing very rapidly over the past two decades, most alcoholic beverages are in the mature stage of the product life cycle. Should the government wish to increase its revenue from this source, it could not expect to do this through consumption growth. Also, for public health and societal purposes it probably would not *want* to increase consumption. The only way to increase revenue is by raising the excise tax. Limited experience with beer and spirits, and extensive experience with tobacco products, indicates that this is a viable and sustainable option.

REFERENCES

Auditor-General. Report of the Auditor-General: The Appropriation and Miscellaneous Accounts in respect of General Affairs. Pretoria: Government Printer, various years.

Carnot N, Koen V, Tissot B. *Economic forecasting*. Houndmills, Basingstoke: Palgrave Macmillan, 2005.

Department of Finance. Budget Speech, various years.

Hendry D, Ericson N (editors). *Understanding economic forecasts*. MIT Press. Cambridge, Massachusetts, 2001.

Parry C, Bennetts A. *Alcohol policy and public health in South Africa.* Cape Town, South Africa: Oxford University Press, 1998.

National Treasury. *The Taxation of Alcoholic Beverages in South Africa*. Pretoria, 2002.

National Treasury, 2013. Revenue Trends and Tax Proposals. [online]
Available: http://www.treasury.gov.za/documents/national%20budget/2013/review/chapter%204.pdf
[Accessed 10 November 2013]

National Treasury. Budget Review, various years.

Van Walbeek, CP. *Measuring changes in the illicit cigarette market using government revenue data: the example of South Africa*. Paper presented at the Biennial ESSA Conference in Bloemfontein, September 2013.

Van Walbeek, CP, 2010. *A simulation model to predict the fiscal and public health impact of a change in cigarette excise taxes*. Tob Control. 2010;19(1):31-6.

WHO, 2010. Technical Manual on Tobacco Tax Administration. [online]
Available: http://www.who.int/tobacco/publications/en_tfi_tob_tax_section1.pdf
[Accessed 10 November 2013]

THE ECONOMICS OF ALCOHOL POLICY IN SOUTH AFRICA

CHAPTER 4

Trends in Alcohol Prices in South Africa

CORNÉ VAN WALBEEK

TRENDS IN ALCOHOL PRICES IN SOUTH AFRICA

1. INTRODUCTION

The previous chapter considered long-term trends in alcohol consumption, excise taxes and excise tax revenue. If the government wishes to increase the excise tax as a mechanism to reduce alcohol use and misuse, the first requirement is that an increase in the excise tax on alcohol increases the retail price of alcohol. The second requirement, discussed in Chapters 7 and 8, is that a change in the price of alcohol changes people's consumption patterns.

This chapter considers trends in alcohol prices between December 2001 and May 2013. The data are discussed in section 2. Section 3 considers trends in the average real (i.e. inflation-adjusted) prices in lager, dark beer, red wine, white wine, brandy, liqueur and whisky. For each of these sub-categories we present real price trends for between two and five well-known and well-monitored (but anonymised) brands. Section 4 considers trends in the nominal prices of the single most monitored brands in each of these sub-categories, and how changes in the excise tax impact the retail price. Section 5 compares the price per litre of beer sold in different packages, and how the "volume discount" has changed over time. The main conclusions of the chapter are presented in section 6.

2. DATA

The data used for this chapter were obtained from Statistics South Africa (SSA). In order to obtain monthly figures for the Consumer Price Index (CPI), SSA performs a comprehensive survey of prices of consumer goods and services. Amongst many other goods and services, SSA collects price data on a variety of alcoholic beverages. SSA kindly made the alcohol price data available to this project.

The data cover a wide variety of products, by brand and also in different packaging. The data are collected in all urban centres across the country. However, information about the geographical location of the outlets, and also the type of outlet (e.g. supermarket, liquor store) was not made available to us.

We obtained monthly price data from December 2001 to May 2013. There is an unfortunate 24-month gap in the data (2006-2007), where the data were "lost at source" but despite this gap one can get a good idea of trends in alcohol prices.

The strength of the data lies in the sheer quantity. In Table 1 the number of observations made available by SSA is shown. For the period 2001-2005 and 2008 an average of about 1000 observations were collected each month (12 000 per year). About 20% of price observations were for beer, about 55% for spirits and about 25% for wine. A negligible number of price observations were collected for flavoured alcoholic beverages.

Since 2009, SSA has greatly increased the number of observations for alcohol prices. The annual number of observations has increased to nearly 40 000 in 2009, but has subsequently decreased to 23 000 in 2012. Under the new data collection regime, nearly 40% of alcohol prices collected are for beer, just more than 40% are for spirits and about 20% are for wine. The coverage of beer has increased at the relative expense of other beverages, especially spirits. Unfortunately, SSA did not monitor the prices of flavoured alcoholic beverages and ciders (e.g. Hooch, Brutal Fruit, and Hunter's Gold).

TABLE 1: NUMBER OF PRICE OBSERVATIONS OF ALCOHOLIC BEVERAGES

YEAR	BEER	FAB	SPIRITS	WINE	GRAND TOTAL
2001*	213	0	592	256	1061
2002	2496	9	6948	2936	12389
2003	2385	1	6615	2810	11811
2004	2389	9	6528	2884	11810
2005	2553	11	6674	3009	12247
2006	0	0	0	0	0
2007	0	0	0	0	0
2008	2839	0	6668	2636	12143
2009	15639	0	16193	7915	39747
2010	14488	0	15508	7470	37466
2011	11180	0	12595	6213	29988
2012	8803	0	9128	5092	23023
2013**	3440	0	3878	2082	9400
Total	66425	30	91327	43303	201085

** One month only (December)*

*** Five months only (January – May)*

The price data are collected in different units of volume (we also use the term "packaging" for units of volume in this chapter). For beer, for example, there are no less than 30 different units of volume, of which the most common are the following (number of observations in parentheses): 340 ml (15886), 6 x 340 ml (11630), 6 x 330 ml (10320), 330 ml (9144), 750 ml (8315) and 440 ml (2673). For spirits, there are nine units of volume, dominated by 750 ml bottles (87 683 of 91327 observations). For wine, there are also nine units of volume, dominated by 750 ml bottles (40740 of 43303), but 5 litre (912), 1.5 litre (538) and 1 litre (454) containers are also monitored in substantial numbers.

To simplify matters, we converted all prices (and taxes) to per litre equivalent, and report the numbers in per litre terms where appropriate. In most of the subsequent analysis, we work in real (inflation-adjusted) terms. We did this by dividing the nominal prices and excise tax by the historical CPI index as published by SSA (http://www.statssa.gov.za/keyindicators/CPI/CPIHistory.pdf). The base of the CPI index is December 2012.

As mentioned in the previous chapter, excise tax on beer and spirits is levied according to the percentage of absolute alcohol. Thus a beer or spirits brand with high alcohol content would be levied at a higher rate than a brand with lower alcohol content. We did a comprehensive internet search for the alcohol content of different beer and spirits brands, and applied these different alcohol contents to the various brands. For wine the alcohol content is not important from the perspective of the excise tax, because the tax is levied on the volume of wine, not on the alcohol content in wine.

We spent many weeks cleaning the data in order to make it usable and comparable with the other data. Some changes were uncontroversial (e.g. correcting spelling mistakes of the brands), but there were some changes that were substantial. For example, bottles of wine with a recorded volume of 340 ml (which is a standard volume for beer but not for wine), but which had a price better aligned to 750 ml, were changed to 750 ml. The volume which was initially recorded was presumably wrong to start with. We believe that these changes improve the quality of the data in at least 90% of cases, but acknowledge that there are

instances where the data provided by SSA were correct, and by changing them, we made an error. However, the very many observations (more than 200 000) on which this analysis is based, suggest that the impact of these errors will be small.

3. AVERAGE PRICES

The data that are collected by SSA can be averaged and arranged in a number of ways. Of course the easiest and often most intuitive way of working with the data is to take averages. The danger of working with an average price is that the "basket" on which the average is based changes over time. For example, if a greater number of more expensive brands are sampled by SSA, then the average price increases, even though the prices of the individual brands may not increase. For a consumer who drinks a particular brand, price changes in that brand are of much greater interest than changes in the average price.

A second danger is that, even though the database is very large, there may be some product categories where the number of observations on which the average price for a particular category is calculated is quite small. Also, it can happen that SSA decides to not monitor a particular brand for a number of months.

Thus we present average price data in two formats. First, we present the averages for the category (e.g. beer, wine and spirits) and/or the subcategories of interest. We also present price trends of well-known or well-monitored brands. For example, as will be shown below, the trend in the average price of dark beer displays some strange anomalies, which, if taken down to the brand level, can be explained quite easily. The brand data is made anonymous, as this is a condition from SSA for our obtaining the data.

The primary aim of this chapter is to provide a meaningful analysis of the trends in alcohol prices. However, a secondary aim is to encourage some readers and interested parties to do further research on alcohol pricing, competitive interactions, and the impact of excise tax increases on the retail price of alcohol (e.g. whether the excise tax increases are fully passed through, absorbed by the industry or even used as a smoke screen to overshift the excise tax increase, etc.). We discuss some of the issues in this chapter, but acknowledge that much more can be done.

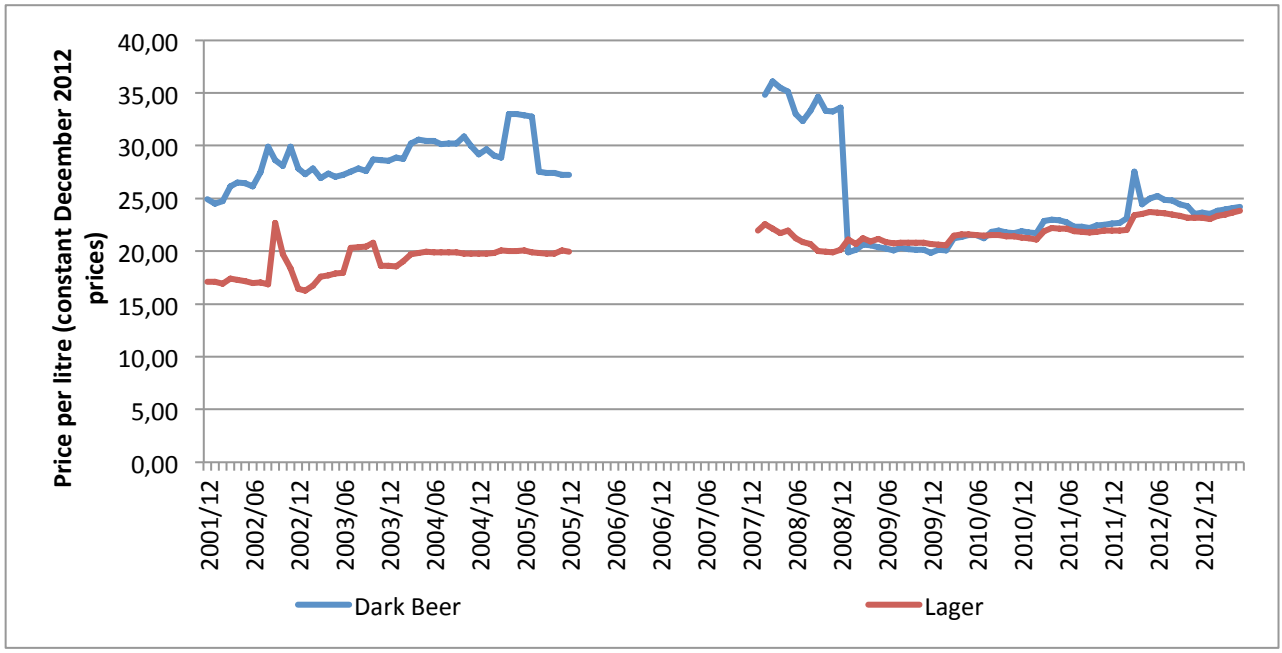
3.1 BEER

Trends in the average real price of lager (i.e. clear beer) and dark beer (e.g. milk stout) are shown in Figure 1. It is clear that the real price of lager has increased, at a fairly consistent rate over the 2001-2013 period, by 38%, from just more than R17/litre in December 2001, to nearly R24/litre in mid-2013. The impact of the excise tax increases can be seen in the "jumps" in March of 2010, 2011 and 2012. However, for the other years the jump in March is not as obvious.

The average price for lager (and dark beer) is based on all types of packaging. As will be pointed out in section 5, buying in bulk reduces the average price per litre. Implicit in this average price is the assumption that SSA surveys the various types of packaging in a broadly representative manner. If bulk packaging is oversampled, for example, this would bias the average price downwards. Similarly, if individual cans/containers are oversampled, this would bias the average price paid by consumers upwards.

The price for dark beer presents an interesting anomaly. At first glance it seems that there was a major and sudden change in the pricing of dark beer in January 2009. The average price in that month fell by 50%. However, it will be shown further down that that structural change is a statistical artefact and not real. After January 2009, the price of dark beer closely followed the price of lager, increasing in real terms by 14% over a three and a half year period.

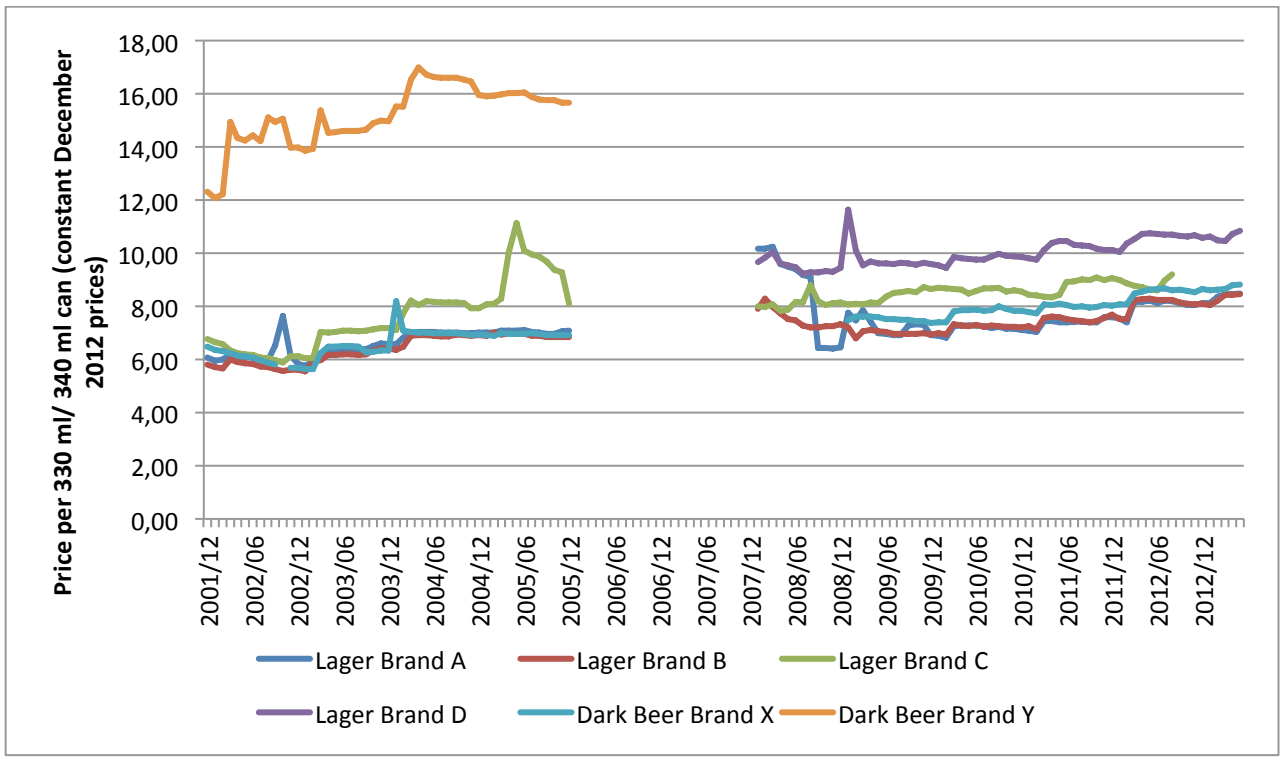
FIGURE 1: *AVERAGE REAL RETAIL PRICES OF BEER, AVERAGED OVER BRAND*



In order to investigate the "dark beer anomaly" and whether the increase in the average price of lager and dark beer (the latter only after January 2009) was the result of a changing "basket", we follow the prices of specific brands. We calculated the average price of beer sold in individual cans of either 330 ml or 340 ml. For this exercise we did not consider beer in any other packaging, because differences in packaging or the quantity of units sold could bias the average price.

For each of the brands, the numbers of price observations that underlie the average price are given in parentheses: lager brand A (6781), lager brand B (3178), lager brand C (2409), lager brand D (2409), dark beer brand X (758) and dark beer brand Y (558). The average real prices per month, by brand, are shown in Figure 2.

FIGURE 2: *REAL PRICES OF SIX LARGE AND/OR INFLUENTIAL BEER BRANDS*



Most of the major beer brands were selling within a narrow range at the start of the 21st century.[1] In 2003, brand C lager started positioning itself as a premium brand and substantially raised its price above the prices of the large competitive brands. However, this attempt seems to have been overdone and during the course of 2005 the price decreased quite sharply. After 2008 brand C was able to maintain its position as a premium lager, extracting a premium of about 15% on average, but this premium is substantially lower than what it was getting in the early months of 2005.

After 2008, SSA started monitoring brand D lager, an international brand, which is fully imported. This brand commanded a consistent premium of between 30% and 40%. The inclusion of such a brand in the basket tends to raise the average price somewhat artificially, as was discussed previously. Consumers who do not drink brand D are not affected by its price. The price increase experienced by drinkers who do not drink brand D will thus be lower than the increase in the average price.

Brand A lager is a well-known South African brand and has been the standard for pricing for most of the time. However, somewhere in 2006 or 2007 this brand was positioned as a high-end premium brand, because at the start of 2009 it commanded a premium of about 25% over brands B and C. The data suggest that this strategy was unsuccessful, because in September 2009 the average retail price of brand A dropped by 30%, and has subsequently followed the price of brand B very closely.

Over the whole period the real retail price of beer has increased by an average of about 2% per year. This increase has been gradual and measured, but very consistent.

The anomaly of the premium for dark beer over lager up to the end of 2008 is explained as follows. Between 2001 and 2005 SSA monitored dark beer brand Y, an international brand brewed in South Africa under licence. The brand commanded a premium of more than 100%. Dark beer brand X was domestically produced and was sold at roughly the same price as non-premium lager. The inclusion of dark beer brand Y in the "basket" of dark beer greatly raised the average price of dark beer, and creates the impression that dark beer was selling at a premium of around 50% over lager.

After SAB terminated all licencing agreements following the Amstel debacle of March 2007, dark beer brand Y was no longer monitored by SSA, presumably because the volumes sold decreased to negligible amounts. Nevertheless, Figure 1 indicates that in 2008 dark beer was still selling at a premium of more than 60%. During 2008 SSA, for reasons that are not known, did not monitor dark beer brand X. The very few dark beer prices that were monitored were all premium brands (although not brand Y). This creates the illusion that the price of dark beer in 2008 was high, but it was high because the single most consumed brand in that year was not being monitored. Since 2009 brand X has been monitored again, and forms the core of the average price of dark beer.

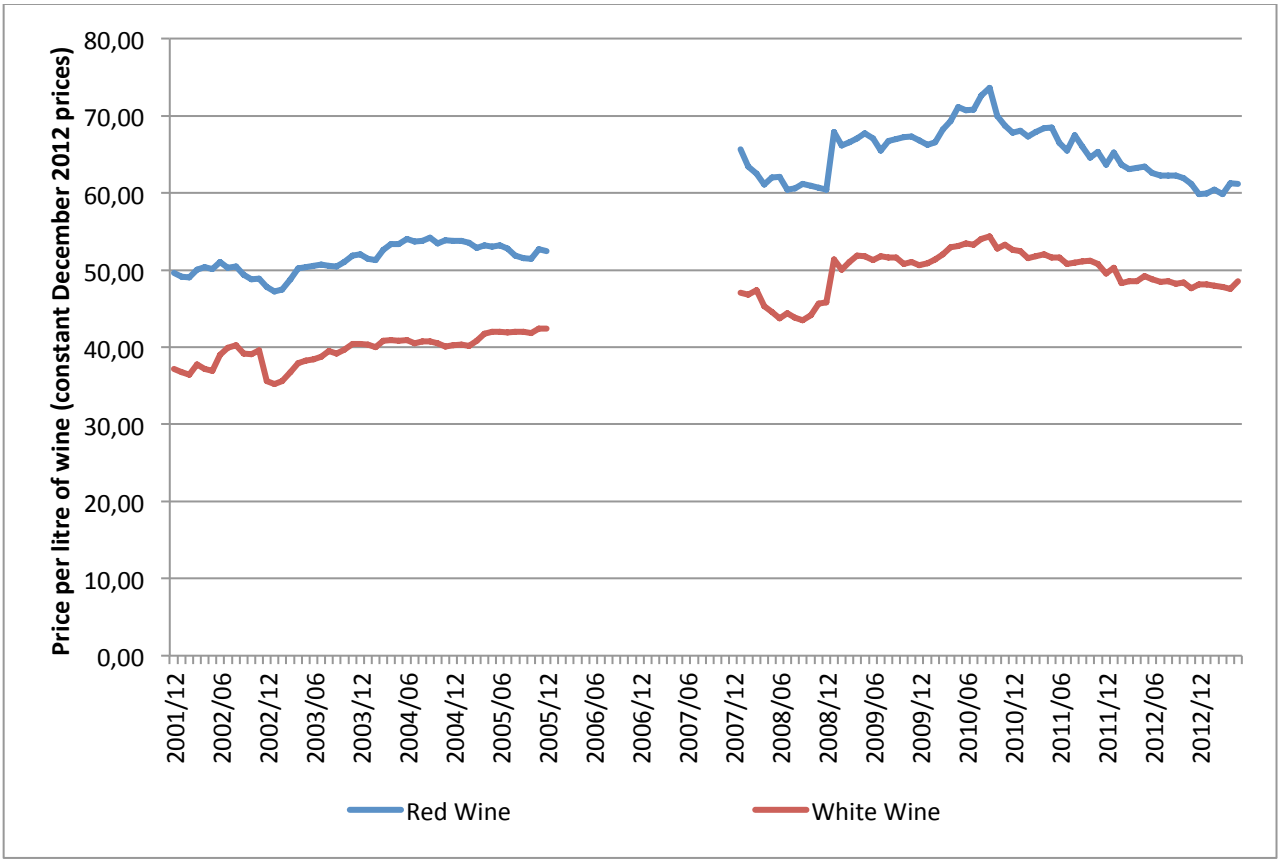
Whereas dark beer brand X was positioned at the same price as non-premium lager in the 2001-2005 period, since 2009 it has commanded an average premium of about 6%.

3.2 WINE

Given the heterogeneity in the wine market, one must read the trends in wine prices with caution. In fact, approximately 400 different brands each of red and white wine have been monitored at some time or another by SSA.

[1] The small spike in the price of lager brand A in 2002 and dark beer in 2004 is the result of a few outliers in the original data, rather than a spike in the median price.

FIGURE 3: *AVERAGE REAL RETAIL PRICES OF WINE, AVERAGED OVER BRAND*



The average real retail prices of wine are shown in Figure 3. Please note that this is the retail price standardised to one litre. While most wine is sold in 750 ml bottles, some wine is sold in larger (and sometimes smaller containers). Figure 3 is based on an average price of all containers. What is particularly striking is that the average prices of white wine follow the average prices of red almost perfectly. In fact, the simple correlation coefficient between the two series is 0.975. The correlation between the year-on-year *growth rates* of the two sub-categories of wine is 0.842, which is also remarkably high. The implication is that, on average, the prices of red wine move in tandem with the prices of white wine, and vice versa.

Two clear trends can be identified. There was a 45% increase in real retail prices of both white and red wine between December 2001 and 2010. However, since these peaks at the end of 2010, the real price of red wine has decreased by 16% and the price of white wine has decreased by 12%.

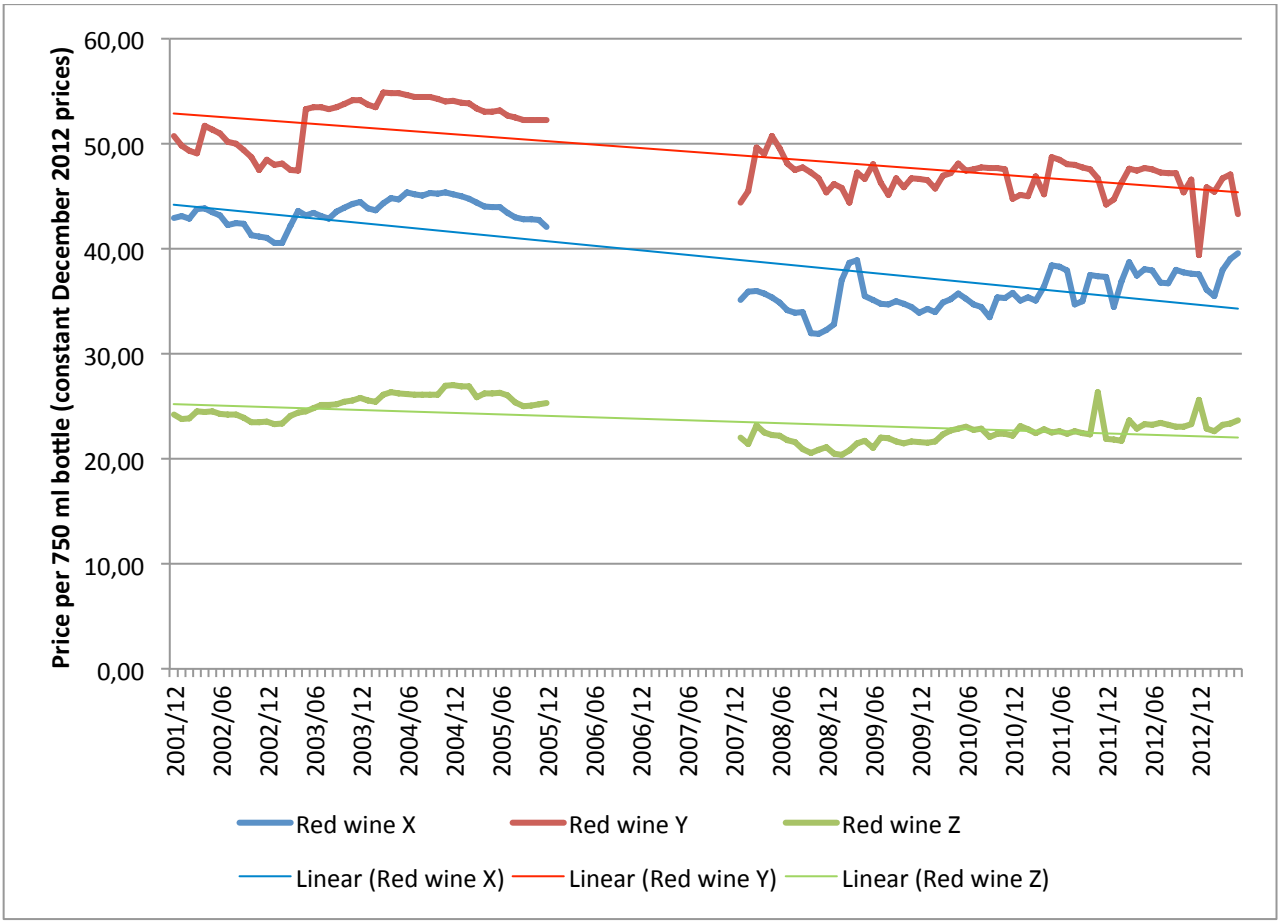
As indicated previously, this could be a statistical artefact. We therefore identified some well-monitored and well-known brands and calculated average prices for each month for them. The number of observations that underlie the average price calculations for each of the brands is shown in parentheses: red wine X (2113), red wine Y (586), red wine Z (2416), white wine A (1274), white wine B (946) and white wine C (1457). The prices are quoted in bottles of 750 ml, because those are the only sizes in which these particular wine brands are sold.

The prices of three red wine brands are shown in Figure 4. Trend lines are added for illustrative purposes. There is a pronounced and consistent decrease in the real price of these three brands. Based on the trend lines, which seem to approximate the underlying price trend well, the price of the most expensive brand (Y) has decreased by 12% over the whole period, compared to a 22% decrease in the mid-price brand (X) and a 13% decrease in the low-price brand (Z).

The price trends experienced by these three brands are quite different from the overall price trends of red wine presented in Figure 3. What this implies is that the SSA "basket" of red wines was loaded with fairly expensive wines between 2001 and 2009. This creates the impression that the average price of red wine has been increasing over that period.

It is possible that this is in fact an accurate reflection of what was happening in the red wine market. Wine estates and cooperatives may have been producing and selling a greater quantity of superior and more expensive red wine. For people buying these new and more expensive brands, the average price of red wine would have been increasing, and Figure 3 would thus be an accurate reflection of the prices that they paid for their wine. However, a person who is loyal to a specific brand, and in particular these three popular brands, has experienced a substantial and consistent decrease in the price of red wine over the past 12 years.

FIGURE 4: *REAL PRICES OF THREE WELL-KNOWN AND WELL-MONITORED RED WINE BRANDS*

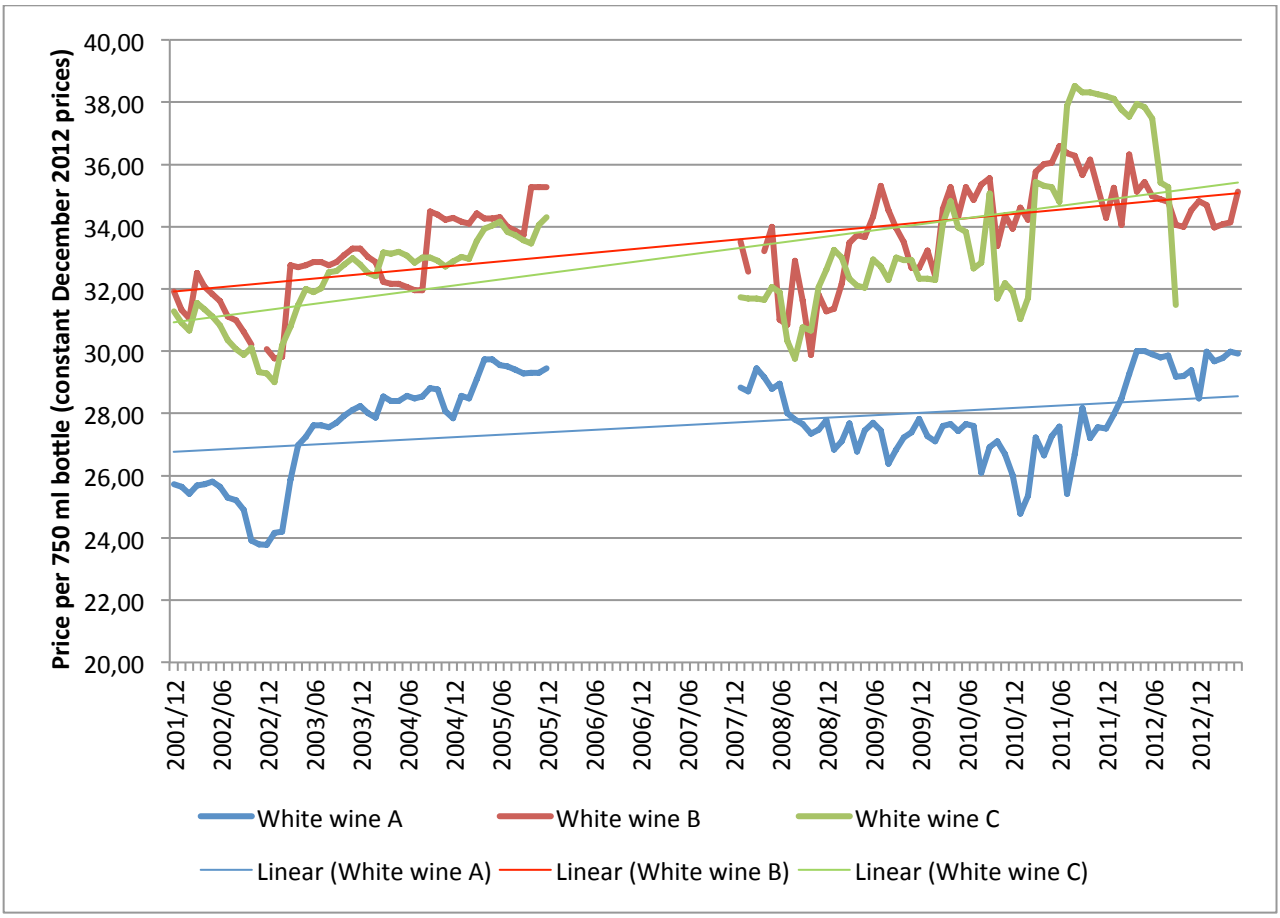


In contrast to the downward trend in the price of red wine, the three most monitored white wines have generally been subject to an upward trend over the past 12 years, although the price movements have generally been more volatile. We have not investigated the price volatility, but note that it is an area for further study.

The trend lines are indicative of the long-term trend only. Fairly substantial deviations from trend do occur. For example, brand A experienced a 14% real price decrease between January 2008 and January 2011, but a 21% increase subsequently. In contrast, brand B has experienced a substantial price increase in the period from January 2008 to mid-2011, and a sizeable decrease subsequently.

Brand C experienced some substantial price swings, and after a sharp fall in price in early 2012, has not been monitored by SSA anymore.

FIGURE 5: *REAL PRICES OF THREE WELL-KNOWN AND WELL-MONITORED WHITE WINE BRANDS*



3.3 SPIRITS

Trends in the retail prices of different categories of spirits are shown in Figure 6. The average prices are based on more than 91 000 observations, which are distributed as follows: brandy (24 723), cane (13), liqueur (28 294), vodka (8544) and whisky (29 713). Brandy, liqueur and whisky have been monitored over the whole period, but vodka was not monitored between 2008 and 2012, and cane has practically not been monitored at all. The analysis below focuses primarily on the prices of brandy, liqueur and whisky.

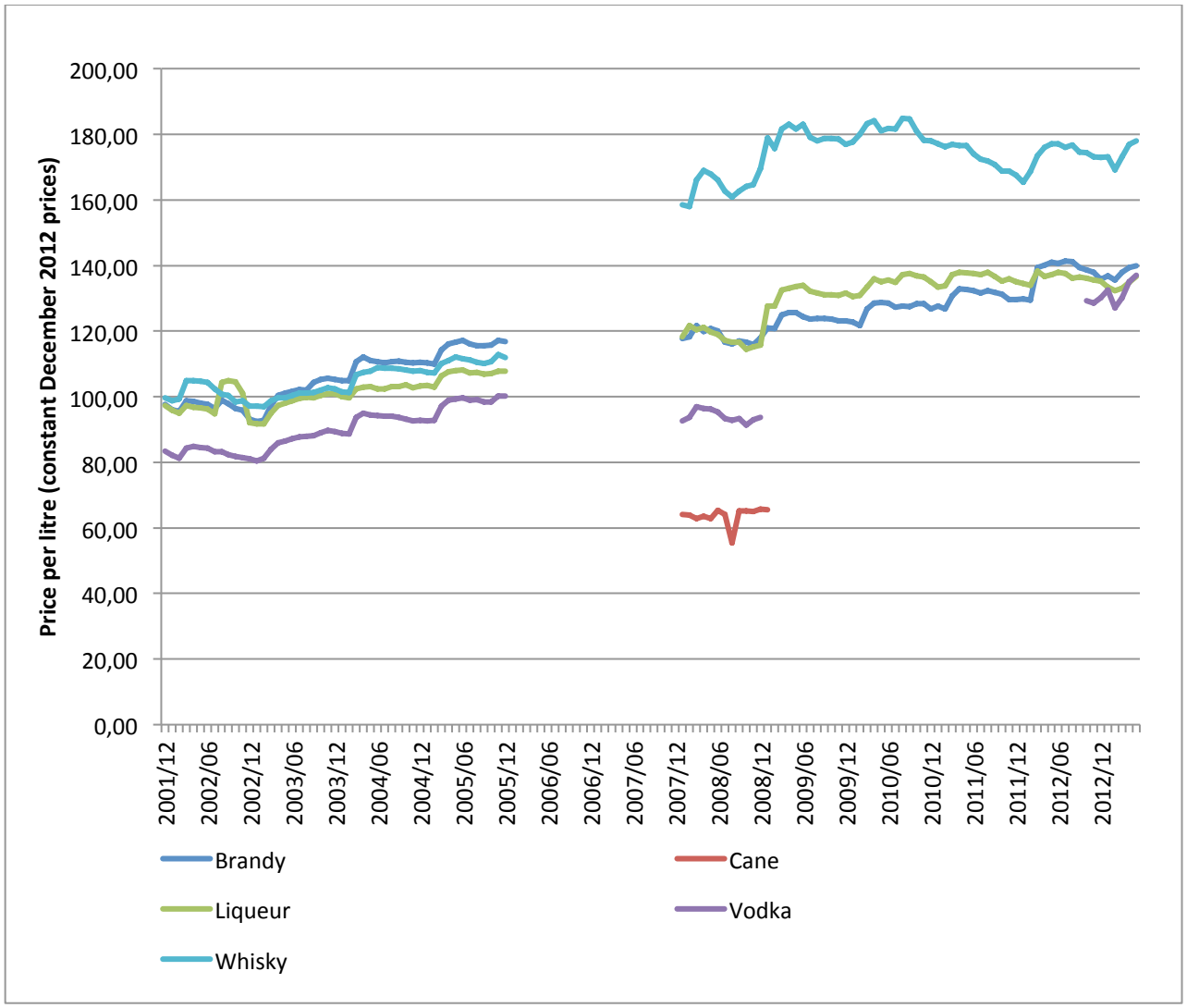
Please note that the prices in Figure 6 are prices per litre. Most spirits are sold in 750 ml bottles, but some are sold in smaller volumes. Figure 6 also includes the prices of smaller containers.

The average prices of liqueur and brandy, and of whisky before 2005, were clustered in a very narrow range. After 2008 average brandy and liqueur prices were still very similar, but the average price of whisky was much higher. There has been a consistent increase in the real price of brandy and liqueur, over the 12-year period, of between 35% and 40%, which corresponds to an average annual increase of between 2.6% and 3.0%.

The price of whisky increased sharply between 2006 and 2007, but the dynamics of this are unclear, given that we do not have price data for this period. It may well be the result of some well-known brands repositioning themselves, as will be discussed later.

For all the spirits sub-categories, one notices pronounced increases in the real price in March of the various years. These "jumps" correspond to the excise tax increases.

FIGURE 6: *AVERAGE REAL RETAIL PRICES OF SPIRITS, AVERAGED OVER BRAND*



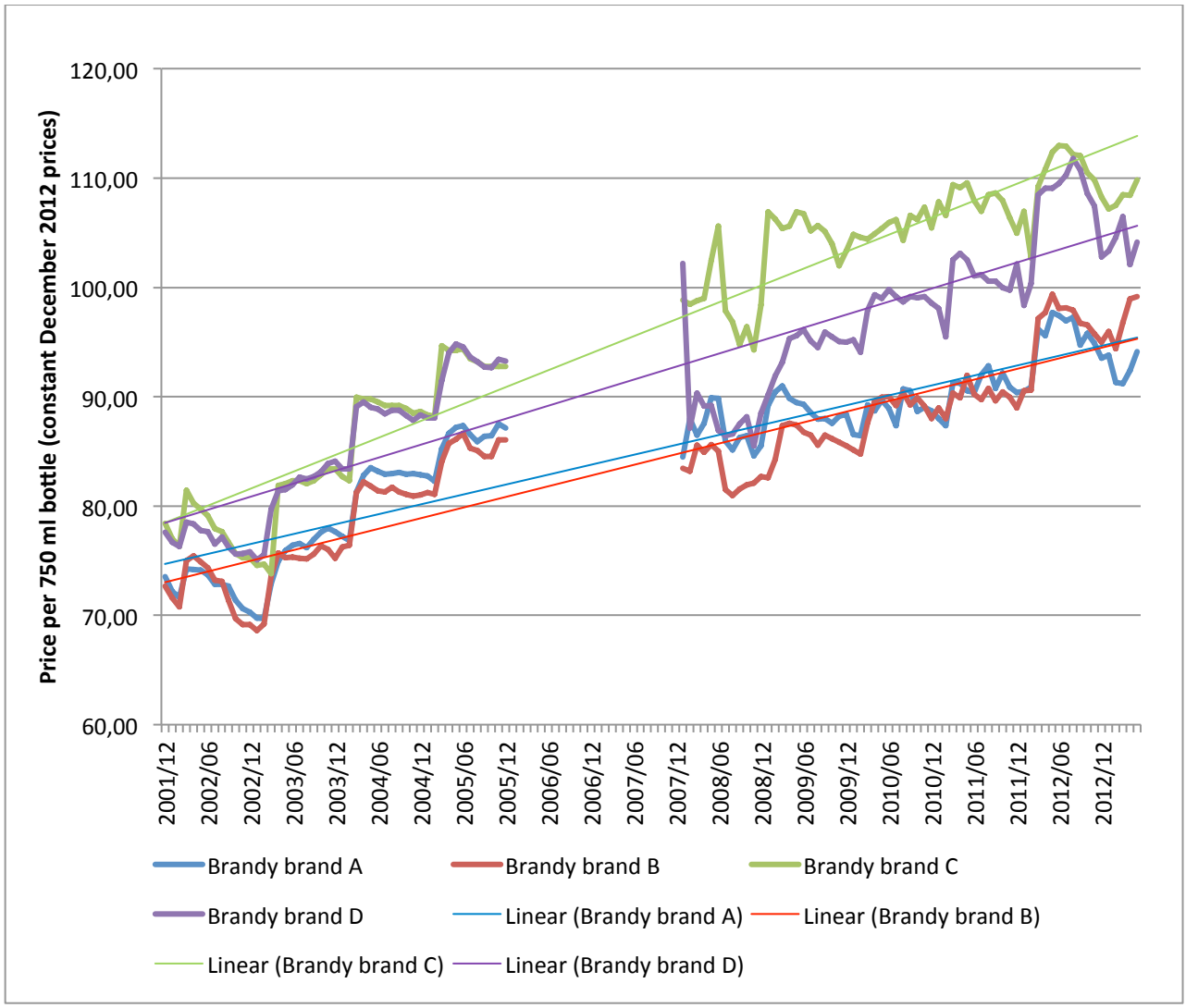
As for beer and wine, we consider the trends in the real price of some important and well-monitored brands below. We limit the study only to beverages that are sold in 750 ml bottles, in order to avoid biases that might be brought about if a brand sells a greater or smaller proportion of its product in smaller volumes, relative to other brands. All the prices refer to 750 ml bottles.

For brandy, real prices in four of the most monitored brands are presented in Figure 7 (opposite page). The number of observations on which the price data are based is shown in parentheses: brand A (5253), brand B (2852), brand C (1648) and brand D (2443). Please note that the graph does not start in the origin, and thus the growth rates in prices look more dramatic than they really are.

Nevertheless, the evidence is clear that the average real price of brandy has increased sharply over the 12-year period. The linear trend lines, which seem to capture the underlying trend quite well, indicate that the real price of brands A and B has increased by between 25% and 30% from December 2001 to mid-2013. The real price of the more exclusive brand C has increased by about 40%. Brand D was sold at practically the same price as brand C between 2001 and 2005, but since 2008 has been selling at a discount to brand C. However, the discount has been shrinking in recent years.

The price trends in the individual brandy brands closely correspond to the average price of brandy, as shown in Figure 6.

FIGURE 7: *REAL PRICES OF FOUR WELL-KNOWN AND WELL-MONITORED BRANDY BRANDS*



Trends in the real prices of four liqueur brands are shown in Figure 8 (following page). The number of observations on which the average prices are based is again shown in parentheses: brand A (9564), brand B (2804), brand C (1419) and brand D (1169). The average prices are calculated based on bottles of 750 ml only (i.e. beverages sold in smaller bottles are not included). The prices in Figure 8 are expressed in 750 ml bottles. Also note that Figure 8 starts in the origin.

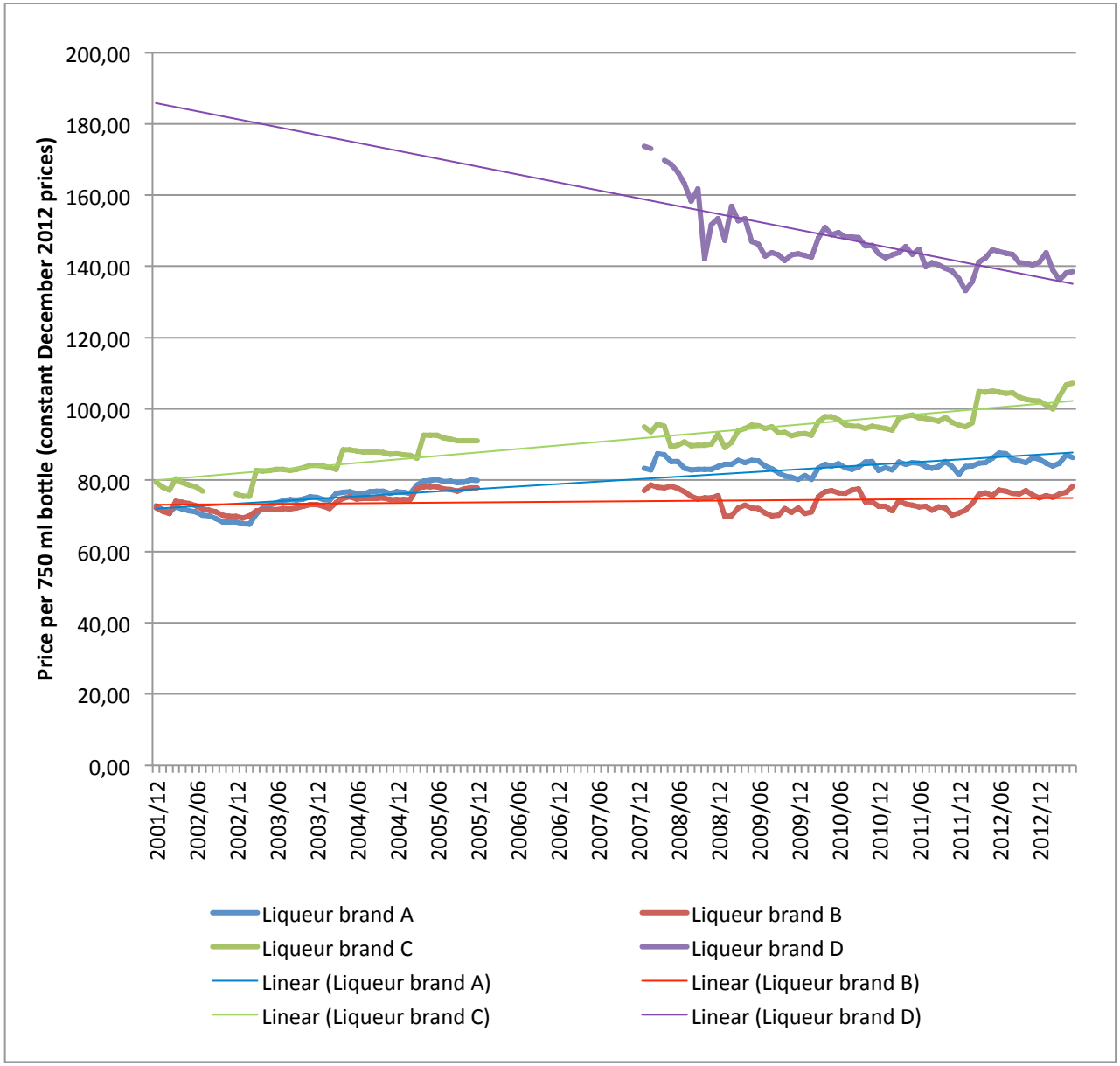
All four brands experienced very steady price trends. Brand A, which is the dominant brand, at least in terms of how it is monitored, has experienced a real price increase of about 20% over the 12-year period. In contrast, the real price of brand B, even though practically the same in 2001, remained broadly constant over the period, and brand B has now become the (substantially) cheaper alternative to brand A.

Brand C, which would not be regarded as a natural substitute to brands A and B by most people, has experienced more rapid price increases than brands A and B. Over the 12-year period the real price of brand C has increased by more than a third.

Brand D was not monitored by SSA before 2005. However, since 2008, when it began to be monitored, the real price has decreased by about 20%.

These rather divergent price trends for four liqueur brands make it quite difficult to say anything about the average price trend for liqueur as a whole. Brands A and C experienced increased real prices, brand B's price remained constant, while brand D experienced a substantial price decrease. Also, the fact that brand D, which is much more expensive than any of the other brands, was included in the "liqueur basket" in 2008, means that it raises the average price of liqueur from this point onwards. Again, people who consume only one brand (say A or B) do not care what happens to the average price of liqueur. They simply care what happens to the price of their brand.

FIGURE 8: *REAL PRICES OF FOUR WELL-KNOWN AND WELL-MONITORED LIQUEUR BRANDS*



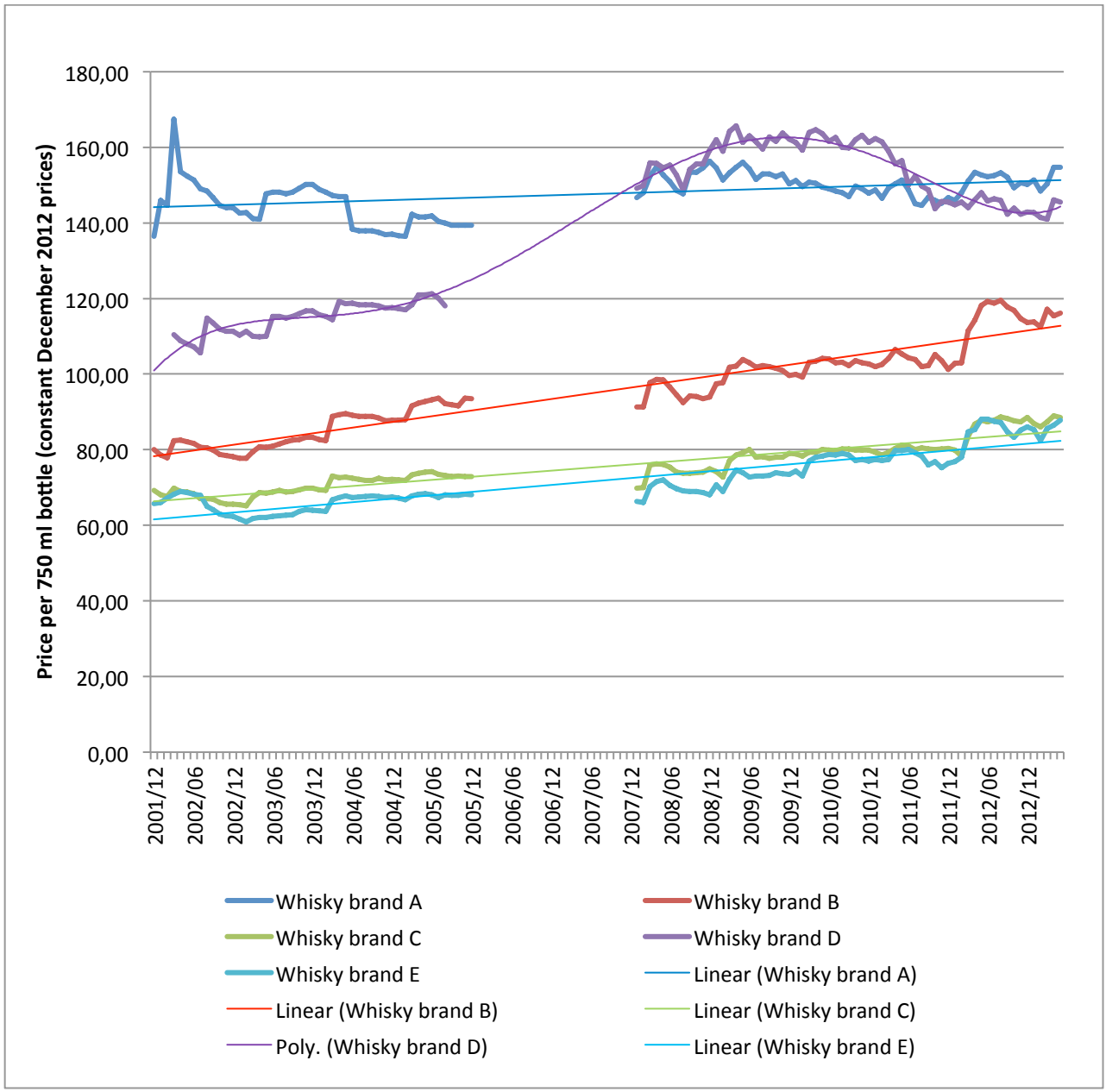
In Figure 9 the trends in the real price of five whisky brands are shown. The number of observations on which the average prices are based is shown in parentheses: brand A (3271), brand B (4704), brand C (2192), brand D (2515) and brand E (3341). The average prices are based on 750 ml bottles only and the prices in Figure 9 are in volumes of 750 ml. The graph is drawn from the origin.

All five brands have experienced substantial real price increases, but the increases have not been of the same magnitude. The real price of brand A, a popular premium brand, has increased by only about 6%, based on the underlying linear trend line. Brands C and E, which are significantly cheaper, have experienced

real price increases of around 30% over the same period. Brand B's real price has been growing at a consistent rate of about 3.2% over this period and is currently 45% higher than previously.

The available price data indicates that brand D has been repositioned from a mid-price whisky (in the 2001-2005 period) to a premium whisky (after 2008). In fact, for about three years it was selling at a substantial premium to brand A, but since the end of 2011 its average price has fallen to below that of brand A. Despite the real price decrease in the past two years, the real price of brand D is about a third higher than it was at the start of the period of interest.

FIGURE 9: *REAL PRICES OF FIVE WELL-KNOWN AND WELL-MONITORED WHISKY BRANDS*



3.4 SOME METHODOLOGICAL OBSERVATIONS

The conclusion of section 3 is that, on the whole, the real prices of alcoholic beverages have increased since December 2001. In some cases, e.g. brandy and whisky, this statement would be unqualified. In other words, both the "average price" for the category and the price for individual brands show an upward trend. However, for some beverages, e.g. liqueur and white wine, one needs to be more careful. Even though the

"average prices", as they would be derived from the SSA database, might indicate a generally upward trend, the prices of individual brands might in fact display a downward trend.

Of course, as people tastes change, and as companies reposition their brands, some brands will experience (relative) price increases and other brands will experience (relative) price decreases. That is normal. The crucial issue is that changes in the composition of the market are reflected in the way that SSA collects the price data. For example, should brand A become more popular and experience greater sales volumes, while brand B experiences a reduction in sales volumes, SSA should increase the relative importance of brand A in the sampling, while decreasing the relative importance of brand B.

In most cases the average price is based on a substantial number of observations. However, it can happen that for some months the average is based on only one or two observations. If that price is representative of all prices, then this is not a problem. On the other hand, the results could easily be distorted quite badly if the price that is monitored is not representative of what it is supposed to represent. Recall the discussion about dark beer. The very high prices recorded for the 12 months of 2008 were based on a sample of one observation only.

The average price for a sub-category (but not for a particular brand) can be quite heavily influenced by the addition of a new brand or the withdrawal of an existing brand from the basket. If the price of that brand was substantially different from the average price, then this effect is greater. For example, when dark beer brand Y was no longer monitored after 2005, there was a considerable reduction in the price of dark beer, but this reduction was largely artificial. Similarly, when liqueur brand D was included in the liqueur "basket" in 2008, this increased the average price of liqueur substantially.

The market is dynamic and "baskets" change. Some brands are added and some are discarded. It takes time for SSA to decide whether it wants to include or discard a brand, and once that decision has been implemented, it will affect the average price. Users of the data should be careful about how they interpret the data.

4. CHANGES IN THE EXCISE TAX AND CHANGES IN PRICES

In this section we consider trends in nominal prices of alcohol, the nominal excise tax, and the total tax burden. The total excise tax burden is the sum of the excise tax plus the VAT amount, expressed as a percentage of the retail price.

In order to avoid the potential pitfalls of working with average prices, this analysis is based on individual brands. With one exception (white wine, because the data were missing for some months) the analysis is based on the brands in the sub-category of alcohol with the largest number of price observations. Thus for beer, we consider brand A for 330/340 ml cans and brand B for 750 ml bottles; for red wine we consider brand Z; for white wine we consider brand C, and so forth. We limit the packaging to a single type of packaging, to avoid any bias that may occur if SSA samples more or less of other types of packaging over time.

For beer we have chosen two types of packaging: (1) 330 ml/340 ml cans, sold individually, and (2) 750 ml bottles, also sold individually. As can be reasoned, and as will be shown in section 5, buying beer in individual 330 ml or 340 ml cans is the most expensive way of buying beer. As such this would be the "upper limit" for beer prices. A substantially cheaper option is to buy 750 ml bottles. Brand B beer is particularly well entrenched in this market segment, and its prices are well monitored by SSA, albeit only since 2008. Such 750 ml bottles are likely to be the "lower limit" for beer prices. The average price of beer, taken across different forms of packaging, is somewhere between the "upper limit" and the "lower limit".

For wine and spirits the chosen packaging is 750 ml bottles, because this is the standard for these beverages.

In this section we touch upon the relationship between the excise tax and the retail price. A more thorough analysis should be done on how the alcohol manufacturing industry sets its retail prices, taking into consideration the excise tax and the competitive environment. We leave this as an incomplete aspect of the report and would encourage students in Economics and Marketing to study this in much greater detail. The alcohol industry's pricing behaviour could have an impact on alcohol policy. A large increase in the retail price tends to depress demand, whether that price increase is caused by an increase in the excise tax or by an increase in the net-of-tax price. The net-of-tax price is the retail prices less the excise tax and the VAT amount.

One would expect an increase in the excise tax to increase the retail price of alcohol. However, it is possible that the alcohol manufacturers might decide not to pass the tax increase through to consumers. For example, if a manufacturer wishes to gain market share it might not raise the retail price when the excise tax is increased, at least not in the short run. If this happens, the tax is undershifted. On the other hand, if manufacturers increase the retail price by more than the increase in the excise tax, the excise tax is overshifted. In industries with a high degree of market power, this is a likely scenario. In fact, overshifting the excise tax has been one of the characteristics of the cigarette pricing model in South Africa since the early 1990s (Van Walbeek, 2005).

A comprehensive and careful study of the pricing strategies of alcohol manufacturers requires sophisticated econometrics. We did not do a full econometric study, primarily because of time and resource constraints. However, we present some diagrams which will give the reader some understanding of the main issues. In each of the diagrams, we show the price and the excise tax in nominal terms on the primary vertical axis. The total tax burden is shown on the secondary vertical axis. For all six diagrams the secondary vertical axis runs from zero to 60%. This allows one to compare the total tax burdens between the different subcategories, without having to worry about the scaling of the axes. For the primary vertical axis the scales vary from one sub-category to another.

4.1 BEER

The nominal price of brand A lager, for individual 330 ml/340 ml cans, and the nominal excise tax levied on beer is shown in Figure 10. The strange pricing behaviour in 2008 was alluded to previously, and may possibly be the result of a flaw in the data.[2] Ignoring this possible data flaw, there is a strong upward trend in the nominal prices, typical in inflationary environments. Retail prices tend to be adjusted in sizeable jumps but not necessarily at predictable intervals. In some years the retail price increases at the same time as the excise tax (e.g. 2010-2012), and then by a greater absolute amount than the increase in the excise tax, indicating an overshifting of the excise tax.

The total tax burden (defined as the sum of the excise tax amount and the VAT amount, expressed as a percentage of the average retail price) on brand A lager has remained remarkably constant at about 25% of the retail price throughout the 2001-2013 period (ignoring the volatility of 2008). This total tax burden is significantly lower than the total tax target of 33% set in 2002, and subsequently increased to 35% in 2012. The primary reason for the tax burden being so low is that the 340 ml single can is the most expensive form

[2] For most months SSA collected about 80 price observations for this brand. However, for 2008 SSA collected an average of only 11 observations. This could skew the average if there are a few outliers amongst them.

of packaging. Buying in bulk would reduce the price and increase the tax burden because the excise tax per litre of beer remains the same.

In Figure 11 the nominal price of brand B lager, sold in individual 750 ml bottles, is shown for the period from January 2008 onwards. Beer bought in 750 ml bottles is currently more than 30% cheaper per litre than beer sold in individual 330 ml or 340 ml cans (for that brand of beer), and is the cheapest beer packaging for which SSA collects data.[3]

Figure 11 shows that price increases in 750 ml bottles of brand B beer are generally synchronised with increases in the excise tax. Also, the excise tax is generally overshifted, at least in nominal terms. The total tax burden has fluctuated in a narrow band of between 29% and 31.5% from January 2008 to February 2013, after which it jumped to just below 33%.

The Treasury indicates that the tax target is levied on the average price of beer. It stands to reason that, if the average tax burden is to be 35%, "cheap" beer (e.g. beer sold in 750 ml bottles) would incur a tax burden of more than 35% to counteract the fact that "expensive" beer (e.g. beer sold in cans) incurs a tax burden of less than 35%.

What we see here is that "expensive" and "cheap" beer both incur a tax burden of less than the targeted 35%, implying that the tax burden on beer on average is less than 35%. The excise tax on beer is currently R63.81 per litre of absolute alcohol, which equates to R1.085 per 340 ml can (5% alcohol) and R2.58 per 750 ml bottle (5.5% alcohol).

The average price of brand B beer in May 2013 (the last month for which we have data) was R12.52 per 750 ml bottle. In order to reach a 35% total tax burden on this type of container, the excise tax should have been R2.84, i.e. 10% more than the current rate of excise tax. Given that large quantities of beer are sold at much higher prices, the excise tax should be substantially higher if the Treasury is to achieve the total tax target percentage that it has set for itself.

In fact, should the amount of the excise tax be determined on the retail price of individual 340ml cans of brand A beer, the excise tax per can would have been R1.97 per can. When set against the current excise tax amount of R1.085 per can, this indicates that the current excise tax amount is well below the 35% total tax target.

While we are not suggesting that the excise tax should be set on the retail price of beer sold in individual 340 ml cans, the analysis of the previous two paragraphs indicates that, according to retail prices monitored by SSA, there is substantial scope to increase the excise tax amount. It seems likely that the Treasury bases the excise tax increases on "recommended retail prices" that understate the actual prices that are being charged by retailers. The result is that the Treasury does not meet the target that it has set itself and also loses revenue that it could have received, simply by charging a higher excise tax amount.

[3] For the period 2008-2013 SSA collected 2499 different prices of brand B beer sold in individual 750 ml bottles. While it is probably true that crates of these bottles (e.g. 12 x 750 ml) would be sold at an even lower per litre-price than beer sold in individual 750 ml bottles, SSA typically does not collect data for this type of packaging. In fact for the whole period SSA collected only 22 prices for beer packaged in 12 x 750 ml bottles.

FIGURE 10: *NOMINAL EXCISE TAX AND PRICE OF BEER (BRAND A) IN 330/340 ML CANS, INDIVIDUALLY SOLD*

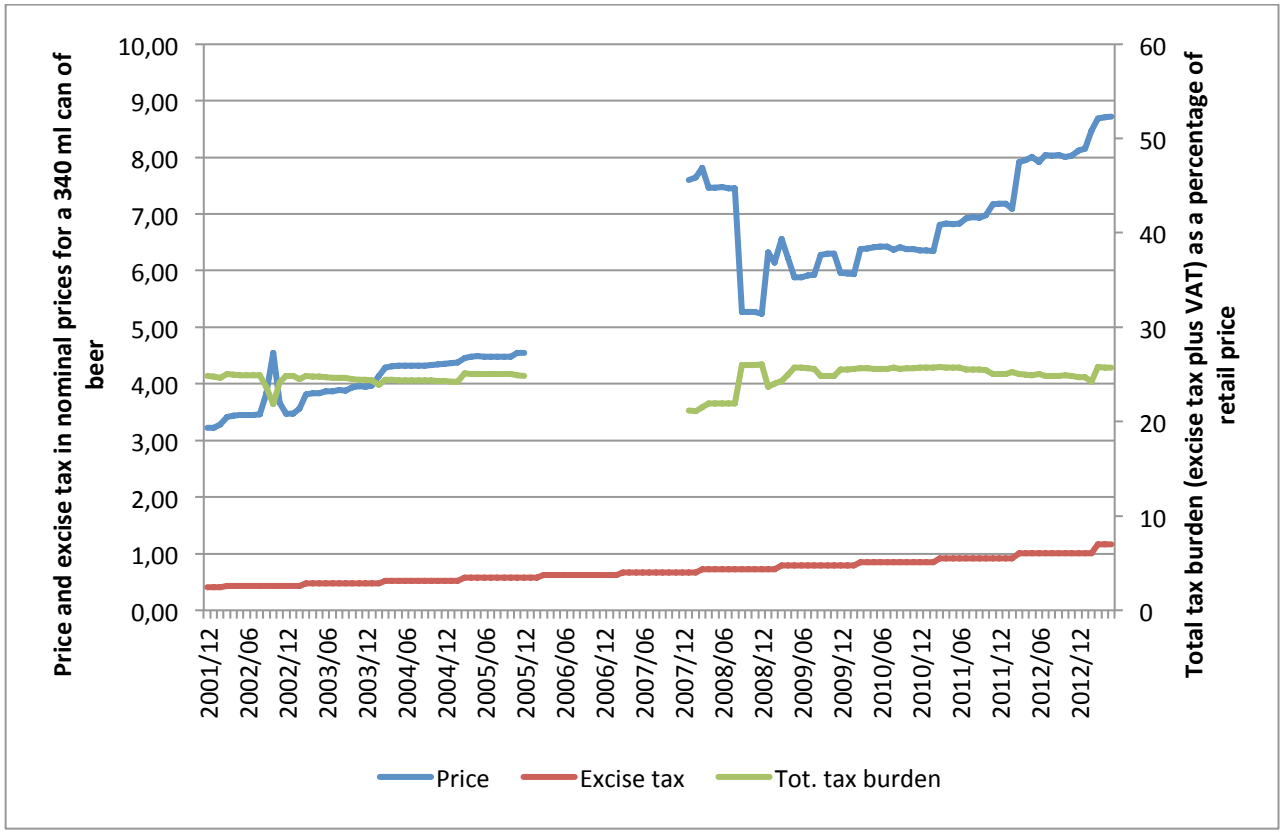
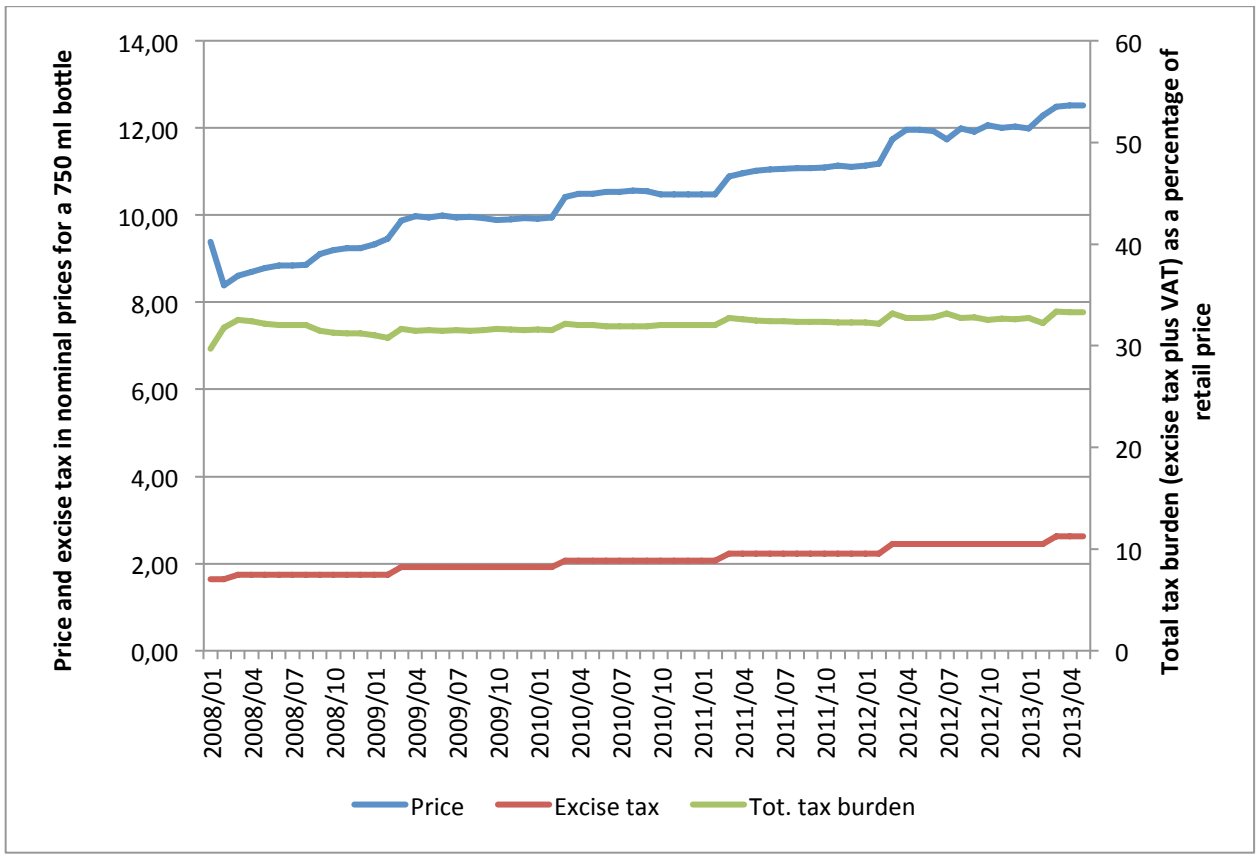


FIGURE 11: *NOMINAL EXCISE TAX AND PRICE OF BEER (BRAND B) IN 750 ML BOTTLES, INDIVIDUALLY SOLD*



4.2 WINE

The nominal prices for brand Z red wine is shown in Figure 12 and for brand A white wine is shown in Figure 13. Both are relatively cheap wines in their respective categories. For both brands there is a fair amount of volatility in the price, but with a predictable upward trend. The increases in the excise tax are so minor that they do not have a noticeable impact on the price.

For the red wine brand the total tax burden has remained remarkably constant at 20% of the retail price since 2008, while for the white wine brand the total tax burden is slightly lower, but also very stable. The tax burdens for these two brands are somewhat lower than the 23% total tax burden target that the Treasury set in 2002 (and kept the same in 2012).

Of the three brands of white wine and the three brands of red wine that were identified previously, brand Z red wine and brand A white wine are the two with the lowest prices, by a sizeable margin (see Figures 4 and 5). However, even for these relatively low price brands, the total tax burden is currently below the 23% target set by the Treasury.

The 23% tax burden target is set on the average price of wine. Currently the excise tax is R2.70 per litre of wine. The average retail price of wine would have to be R25.23 per litre (or R18.93 per 750 ml bottle) if the 23% target is to be met. Of course, there is very substantial variation in the price of wine, and it seems likely that a large proportion of wine is sold in containers larger than the standard 750 ml bottle. However, anecdotal evidence from walking through a typical liquor outlet suggests that very little wine is sold at less than R18.93 per bottle (or equivalent), suggesting that the average of R18.93 is too low.

If this analysis is valid, it suggests that the excise tax on wine is set too low, and that the 23% tax burden target is not being met.

FIGURE 12: *NOMINAL EXCISE TAX AND PRICE OF RED WINE (BRAND Z), 750 ML BOTTLE*

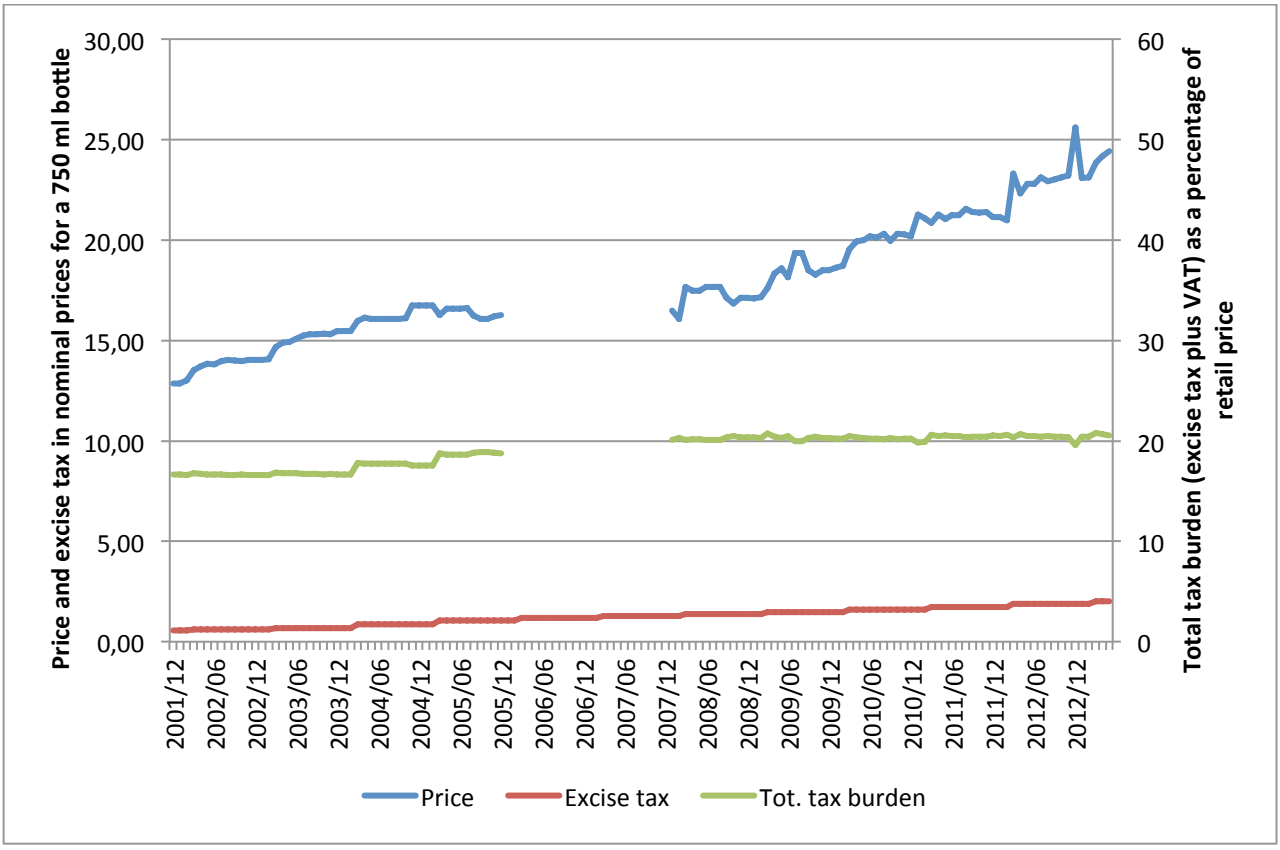
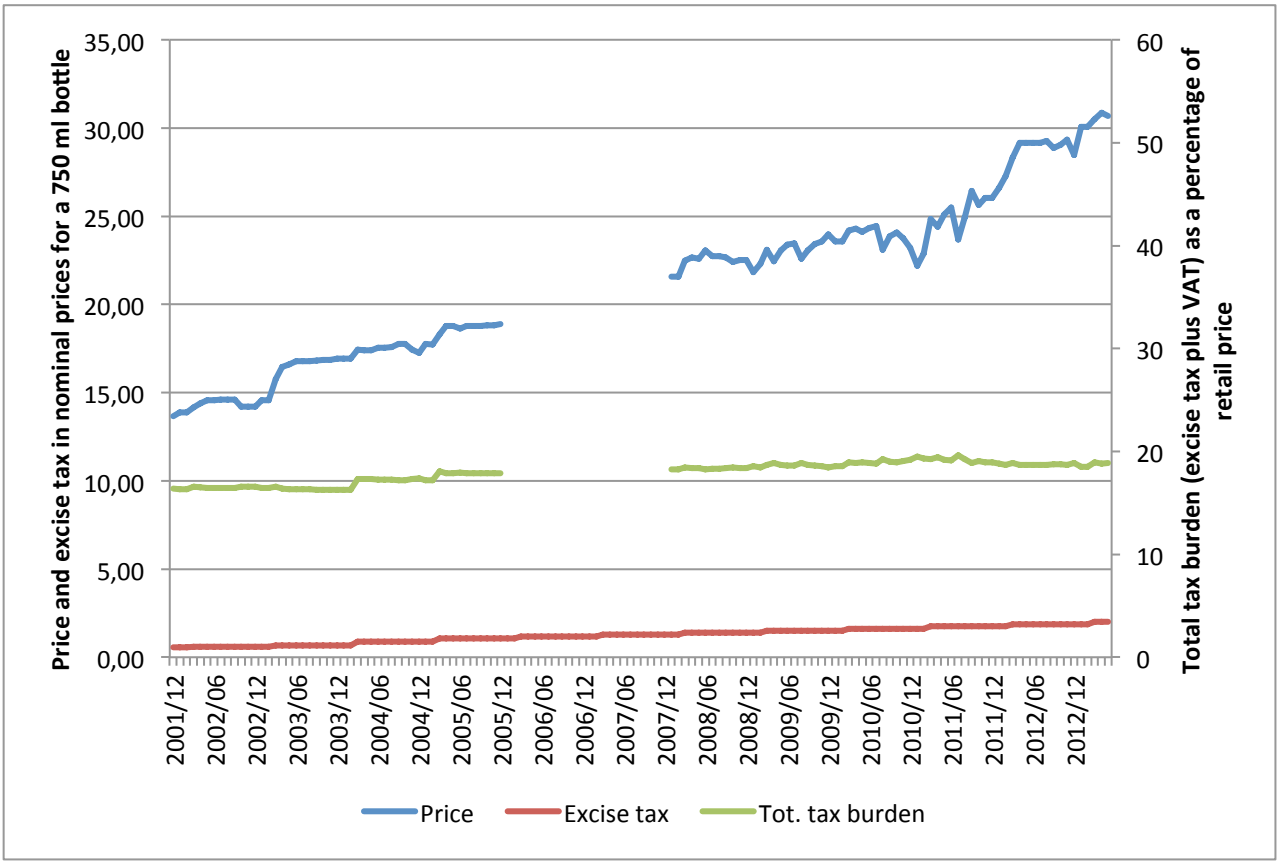


FIGURE 13: NOMINAL EXCISE TAX AND PRICE OF WHITE WINE (BRAND A), 750 ML BOTTLE



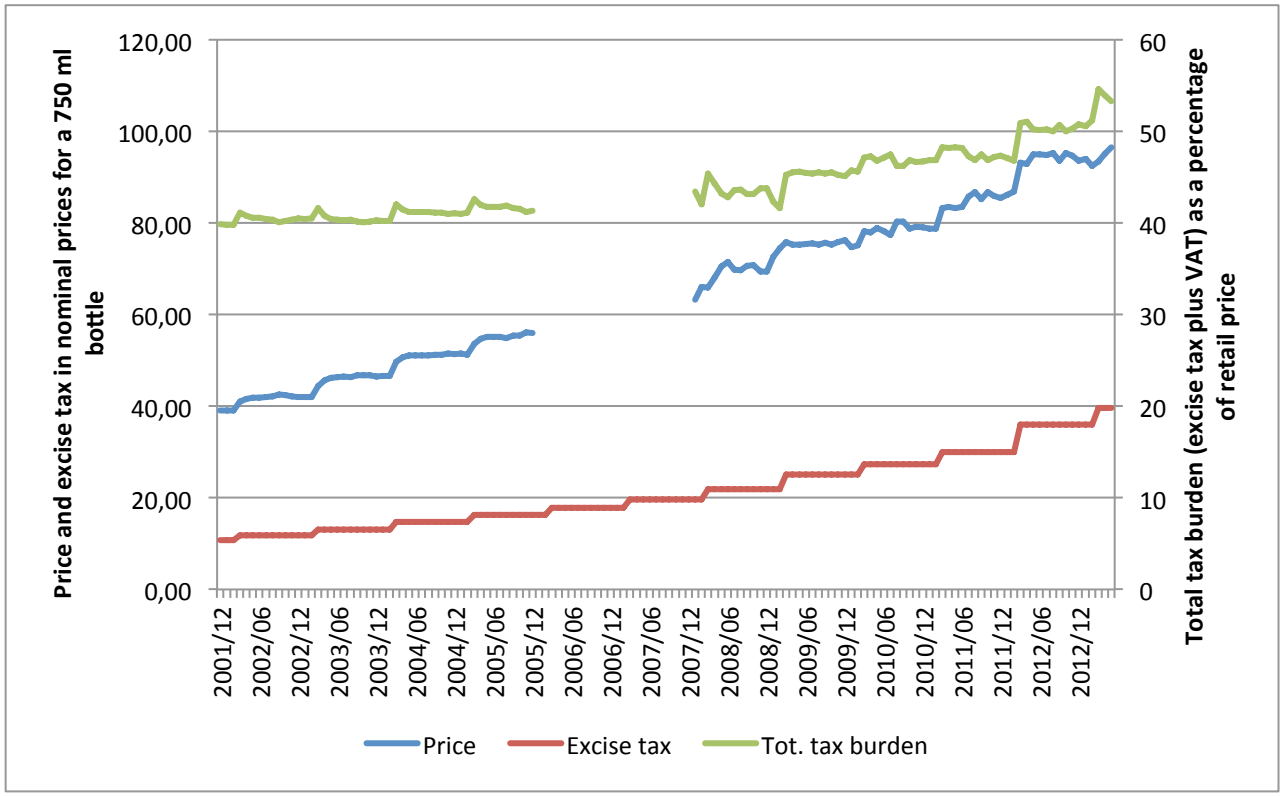
4.3 SPIRITS

The nominal retail price of brand A brandy, together with the excise tax levied, is shown in Figure 14. This is a high-volume, relatively cheap brand. The nominal price has been increasing quite rapidly and is 135% higher in mid-2013 than in December 2001. The nominal excise tax has increased by 268% from R10.76 per 750 ml bottle in 2001 to R39.60 at present. Although there is some "bumpiness" in the data, one can see that the retail prices have increased broadly in line with the increases in the excise tax.

The total tax burden was slightly above 40% between 2001 and 2005, but has subsequently increased sharply to 53% of the retail price. The targeted total tax burden for spirits is 48%. Of course, variations in alcohol content and variations in the retail price imply that some products will be subject to a higher total tax burden and others to a lower tax burden. Brand A brandy has 43% alcohol content, which is the standard for spirits. The fact that its total tax burden is greater than the target implies that the retail price of brand A brandy is lower than the average.

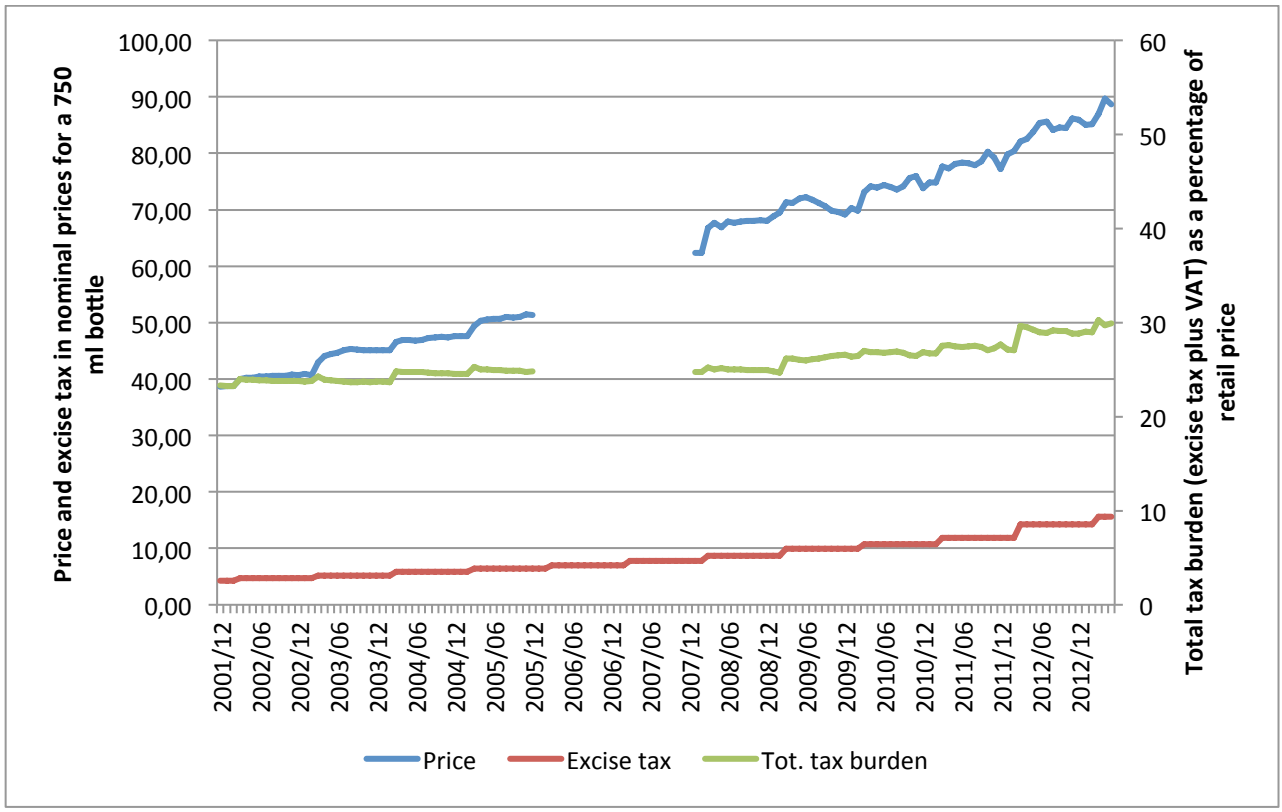
In fact, based on the current excise tax of R122.80 per litre of absolute alcohol for spirits, and 43% alcohol content, the excise tax is R52.80 per litre and R39.60 per 750 ml bottle. If the total tax burden is 48%, then the excise tax burden is 35.7%, which implies that the price per bottle would have to be R110.93.

FIGURE 14: *NOMINAL EXCISE TAX AND PRICE OF BRANDY (BRAND A), 750 ML BOTTLE*



The nominal price for brand A liqueur is shown in Figure 15, together with the excise tax. The excise tax graph has the same shape as that of brandy, but is at a much lower level, given that the alcohol content is only 17%, compared to 43% for brandy. The total tax burden, not surprisingly, is also much lower. It increased from about 24% in the 2001-2005 period to 30% at present.

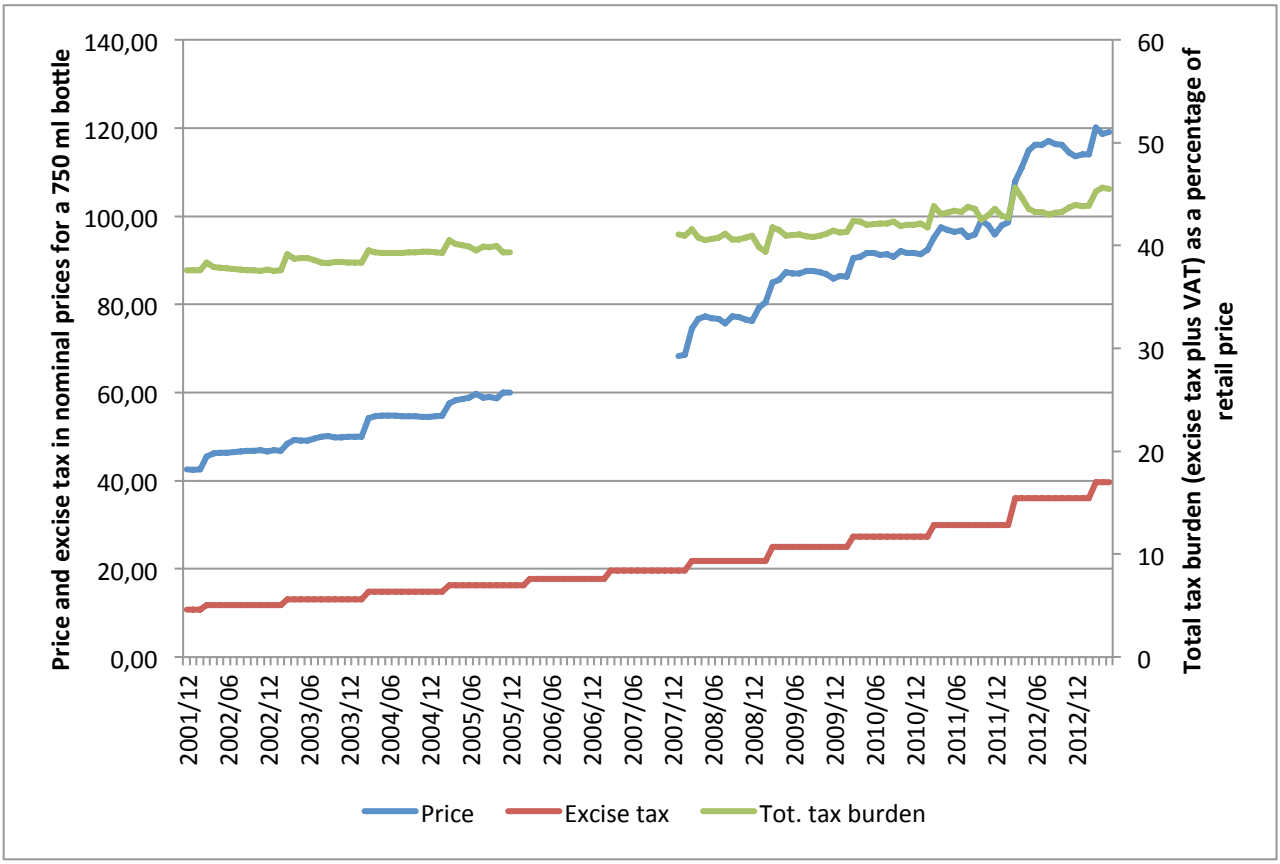
FIGURE 15: *NOMINAL EXCISE TAX AND PRICE OF LIQUEUR (BRAND A), 750 ML BOTTLE*



Lastly, we consider the price of brand B whisky in Figure 16. Brand B is a mid-price brand, and, as discussed in section 3.3, has experienced the most rapid real price increase of the five whisky brands that were reported on. There seems to be substantial evidence of overshifting of the excise tax. This is particularly pronounced in early 2012, but is also visible in nearly all other years. In 2012 the nominal excise tax increased by R6 per 750 ml bottle, which corresponded to the Treasury's decision to increase the total tax burden on spirits from 45% to 48% of the retail price. In response to the R6 increase in the excise tax, the retail price increased by R15 within the space of three months. This suggests that the manufacturer was able to use the excise tax increase as a "smoke-screen" to increase the net-of-tax price of the product.

The total tax burden for brand B is currently about 45% of the retail price. This has increased from just below 40% in the 2001-2005 period. It is less than the 48% target, but this is because the price of this brand is higher than the R110.93 per 750 ml bottle calculated previously.

FIGURE 16: *NOMINAL EXCISE TAX AND PRICE OF WHISKY (BRAND B), 750 ML BOTTLE*



Because whisky tends to be more expensive than brandy one finds that the total tax burden on whisky is lower than on brandy. Whisky and brandy both have 43% alcohol content, in general, implying that the tax amount per bottle is the same for both. Currently this is R39.60 per bottle. Simple arithmetic then tells us that the product with the lower price would carry a higher tax burden, and vice versa.

This is not a bad thing. A specific tax tends to compress retail prices of products of different qualities. Had the tax been levied as an ad valorem tax, low-price products would attract a lower tax and high-price products would attract a higher tax. Thus the low-price product would be "subsidised" by the Treasury through a lower tax rate. This would make the low-price product even cheaper. Since most alcohol abuse is because of the consumption of cheap liquor, a tax regime that raises the retail price of cheap liquor is appropriate.

5. THE IMPACT OF VOLUME ON THE PRICE PER LITRE

The last section of this chapter considers the impact of the size of packaging on the price per litre. Most alcoholic beverages are sold in a variety of containers. For example, wine is typically sold in 750 ml bottles, but it is also sold in 3 litre and 5 litre boxes and in bottles smaller than 750 ml. Liqueurs are typically sold in 750 ml bottles, but also in 1 litre bottles. Similarly, spirits are typically sold in 750 ml bottles, but also in smaller bottles.

However, the beverage with the largest variation in the packaging is beer. The analysis to date focused on 330 ml/ 340 ml cans, but many other forms of packaging are available. In fact, as mentioned in section 2, the price database supplied by SSA has 30 different forms of packaging for beer.

In order to illustrate the impact of different packaging on the price per litre, we consider a particular brand of beer, in order to avoid the biases that could be introduced because different brands sell at different prices. Brand B lager has been monitored extensively since 2008, and is sold in different packaging (number of observations is shown in parentheses): 340 ml (1713), 6 x 340 ml (2350), 6 x 330 ml (1701), 6 x 440 ml (608) and 750 ml (2499).

The real retail price per litre, for various packaging options, is shown in Figure 17. As is to be expected, the price per litre of brand B lager sold in individual 340 ml cans is the highest. The discount of the other packaging, relative to the 340 ml can, is shown in Figure 18. The discount is defined as the difference between the price per litre of the 340 ml individual can and the other packaging, expressed as a percentage of the per litre price of the 340 ml individual can.

The prices per litre of beer of the six-packs are similar for most of the period, but deviate somewhat in the latter half of 2011 and even more during 2012. The discount of the 6 x 330 ml cans decreased from about 10% in 2009-2011 to 8% at present. The discount of the 6 x 340 ml cans/bottles has remained broadly constant at 12% since 2009, while the discount of the 6 x 440 ml cans has increased from about 12% in 2009-2010 to 18% at present.

The price per litre of 750 ml bottles has been substantially lower than that of 340 ml cans throughout the period. In recent years the discount has increased from around 25% in 2009-2010 to 33% at present.

In May 2013 the average price of a 340 ml can of brand B was R8.50, compared to the average price of R12.50 for a 750 ml bottle. Thus the consumer paid R4.00 extra for an additional 410 ml beer, or an equivalent of R9.76 per litre (at the margin).

FIGURE 17: *REAL RETAIL PRICE OF BEER (BRAND B), PER LITRE, BY TYPE OF PACKAGING*

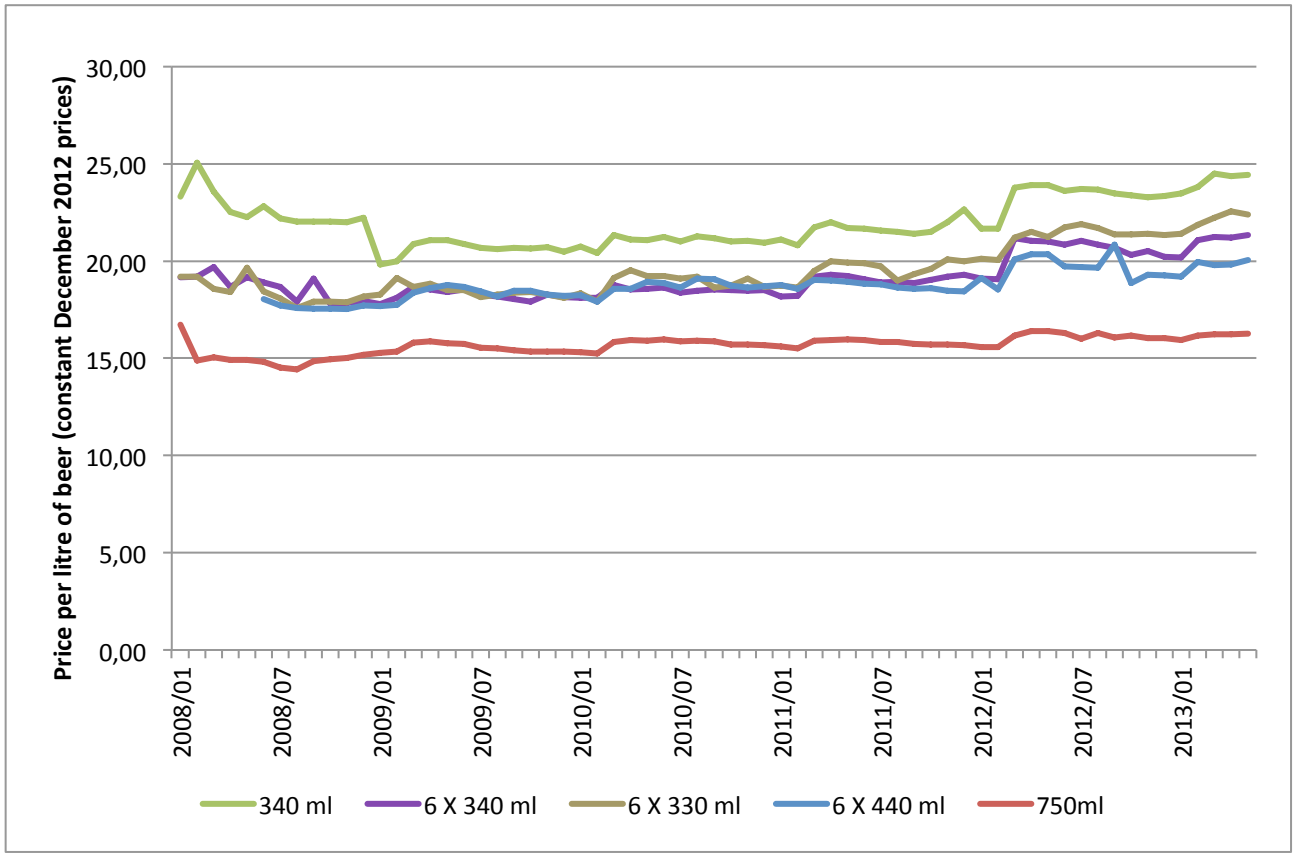
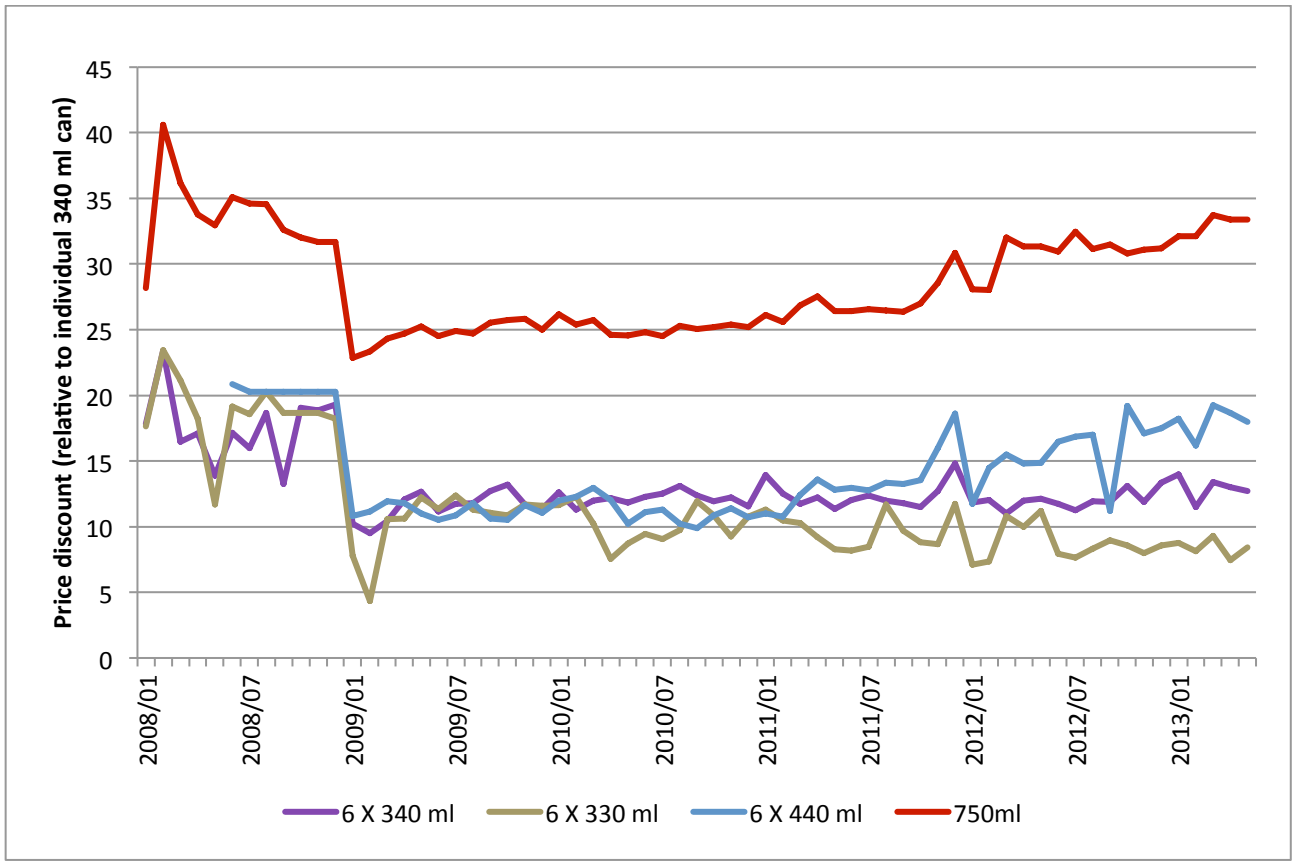


FIGURE 18: *DISCOUNT OF OTHER FORMS OF PACKAGING, RELATIVE TO INDIVIDUAL 340 ML CANS (BRAND B)*



From the perspective of a government that aims to reduce the excessive use of alcohol, this is disturbing. Beer consumers are incentivised to drink larger quantities at one drinking session. A 2010 advertisement for Carling Black Label entitled "Grootman of laaitie: Vra vir die volle 750 ml" ("Adult man or kid: Ask for the full 750 ml") attracted negative responses from some civil society groups on the grounds that it encouraged excessive drinking and suggested that a person is only a man if he consumes large quantities of beer (http://minilicious.wordpress.com/2010/06/03/why-south-african-breweries-pulled-out-the-grootman-of-laaitie-advert/).

6. CONCLUSION

The price of a product is a crucial determinant of the demand for that product. In this chapter we investigated the price of a variety of alcoholic beverages, based on a database made available by SSA. In general, the real price of alcohol has been increasing over the past 12 years.

There is strong evidence to indicate that an increase in the excise tax leads to a near-immediate increase in the price of alcohol. In some instances the retail price increased by more than the increase in the excise tax, although more rigorous econometric analyses would be required to confirm this. The fact that excise tax increases are passed through to consumers, in the form of higher retail prices, indicates that excise taxes have the potential to be effective tools to reduce alcohol consumption. The effectiveness of the tool depends crucially on how sensitive consumption is to changes in the price. As will be shown in Chapters 7 and 8, the consumption of alcohol is negatively related to the price of alcohol.

The Treasury has set total tax burden targets for the three categories of alcohol as follows: beer (35%), wine (23%) and spirits (48%). What this chapter has highlighted is that there are substantial differences in the price of different sub-categories and brands of these alcohol categories. The targets are set for the "average" price. This is not a simple matter, and in order to calculate the average one would require much and detailed data.

The current (2013/14) excise taxes are as follows: beer (R63.81 per litre of absolute alcohol), wine (R2.70 per litre of wine, irrespective of alcohol content) and spirits (R122.80 per litre of absolute alcohol). To meet these tax burden targets, the retail price of a 340 ml can of beer (5% alcohol content) would have to be R4.78; the retail price of a 750 ml bottle of wine would have to be R18.93 and the retail price of a 750 ml bottle of spirits would have to be R110.93.

Based on the data that we have, we find that the total tax burden on beer and wine is substantially less than the target set by the Treasury. The actual tax burden on spirits seems to be more closely aligned with the target. Should the actual total tax burden be found to be less than the Treasury's target, this would require an adjustment in the excise tax.

THE ECONOMICS OF ALCOHOL POLICY IN SOUTH AFRICA

CHAPTER 5

The Negative Externalities of Alcohol

JODIE POSEN
DEBORAH MURIUKI

THE NEGATIVE EXTERNALITIES OF ALCOHOL

1. INTRODUCTION

Alcohol use is a complicated health and social issue. The Comparative Risk Assessment study on the burden of disease and injury attributable to 67 risk factors shows that alcohol use has risen from being the 8th highest global risk factor in 1990 to the 5th highest risk factor in 2010 (Lim et al., 2012). In Eastern Europe, Andean Latin America and Southern Africa alcohol use was ranked as the worst risk factor as it has the highest attributable burden of disease. This is partly because the most risky patterns of drinking prevail in Kazakhstan, Mexico, the Russian Federation, South Africa and the Ukraine (WHO, 2011). Considerable harm is done through alcohol abuse, while moderate drinking produces some benefits. The detrimental effects of alcohol consumption on health and safety constitute a major economic burden, reducing the overall standard of living. The critical issue is how to prevent and control the abuse of alcohol effectively and to minimize its associated harms.

This chapter explores the harms of alcohol, including 1) health and crime expenditure, 2) labour and productivity costs and 3) non-financial welfare costs, globally and in South Africa. A discussion of the impact of alcohol on health covers many different areas, including chronic, acute and alcohol-attributable conditions, as well as infectious diseases (Parry and Dewing, 2006). Chronic heavy drinking causes organ damage, which results in disability and early death (Cook and Moore, 2002). The extent to which alcohol use causes health and crime issues can be estimated through the use of an Alcohol Attributable Fraction (AAF). Health and crime expenditure also include the resources used up because of health-related harms. These include spending on health care and police, as well as damage to property. The labour and productivity costs of alcohol use reduce economic output and production through decreased productivity and premature mortality. These costs suggest that the economy would be stronger in the counterfactual scenario, without alcohol (Moller and Matic, 2010). The third type of cost is the non-financial welfare cost; this refers to pain, suffering and premature loss of life.

In order to explore the costs of alcohol, this review discusses the theory of hazardous drinking, the geographic dispersion of risky drinking and the economic theory of negative externalities. This is followed by a detailed analysis of the costs of alcohol use in health, crime and non-financial areas. To conclude this analysis, different policy options working against negative externalities, and their effectiveness in South Africa, will be discussed, with particular emphasis on the taxation of alcohol.

2. HAZARDOUS DRINKING

In order to measure and compare the alcohol-attributable disease burdens across the world, aspects of alcohol consumption must be found that are, firstly, related to disease and secondly, globally accessible. Two such dimensions have been identified, namely the average volume of consumption and the patterns of drinking (Rehm, 2003). These measures are particularly correlated with acute health outcomes such as injuries and chronic disease. Patterns of hazardous drinking vary in different countries and regions and are expressed as a pattern score. A pattern score is a numerical representation of the way in which alcohol is typically consumed in a country, based on sample surveys and responses from key informants (Obot, 2006). The score increases with the level of hazard that may result from drinking and follows the assumption that the consequences of alcohol consumption are related to the volume consumed, as well as when, how and why consumption takes place. Certain indicators used to determine hazardous drinking include the number

of heavy drinking occasions, a high quantity of alcohol consumed, drinking in public places and drinking with meals and at community festivals (Obot, 2006).

A score of 1 represents the least hazardous pattern of drinking and a score of 4 the most hazardous. The scoring, by summation of individual questions, has a range of 0-17 points that translate into a 1-4 pattern score as follows:

- 10–17 points: assign a pattern value of 4
- 7–9 points: assign a pattern value of 3
- 4–6 points: assign a pattern value of 2
- 0–3 points: assign a pattern value of 1

TABLE 1: 'PATTERN OF DRINKING' POINT SYSTEM (0-17 POINTS ASSIGNED)

HEAVY DRINKING OCCASIONS (Maximum of 11 points for this component)	**DRINKING IN PUBLIC PLACES** (Maximum of 2 points for this component)
Daily drinking Less than 20% daily drinking for males: **1 point** Less than 10% daily drinking for females: **1 point** **Frequency of getting drunk** Most male drinkers usually get drunk when they are drinking: **2 points** Most male drinkers often get drunk: **1 point** Most female drinkers usually or often get drunk: **1 point** **Usual quantity per drinking session** Males: more than 60% typically consume 4 or more drinks per session: **2 points** Males: between 40 and 60% consume 4 or more drinks per session: **1 point** Females: more than 50% consume 4 or more drinks per session: **2 points** Females: between 35 and 50% consume 4 or more drinks per session: **1 point** **Fiesta binge drinking** Males: fiesta drinking commonly occurs: **1 point** Females: fiesta drinking commonly occurs: **1 point**	Males: common and every day: **1 point** Females: common and every day: **1 point**
DRINKING WITH MEALS (Maximum of 4 points for this component)	
Males: rarely or never with meals: **2 points** Males: sometimes with meals: **1 point** Females: rarely or never with meals: **2 points** Females: sometimes with meals: **1 point**	

Source: Rehm et al. 2003

Most African countries have a pattern score of 3, indicating that although per capita consumption of alcohol is generally low, the most common way of drinking is in an "all-or-nothing" fashion, with a high potential of causing health or social harm. Drinkers in these countries tend to consume large quantities in short time periods, drink outside of mealtimes and drink frequently; that is, they often drink with the intention of getting drunk. This pattern can also be seen in other parts of the developing world, in young people and in certain groups in European countries (Room et al., 2005). The pattern and level of drinking in a country or a particular group indicates the possible types of alcohol-related problems that may occur within that country or group (see appendix 1 for disease burdens linked to drinking patterns).

TABLE 2: PER CAPITA CONSUMPTION OF RECORDED CONSUMPTION AND DRINKING PATTERN SCORE IN SELECTED AFRICAN COUNTRIES

Country	% who drink			Recorded Consumption (L of ethanol per capita)	Unrecorded Consumption (L of ethanol per capita)	Drinking pattern score
	Total	Male	Female			
Botswana	46.5	63	30	5.38	3.0	3
Kenya	45	55	35	1.74	5.0	3
Lesotho	26	53	19	1.83	-	3
Nigeria	24.4	48.7	10.4	10.04	3.5	2
Seychelles	72.5	90	55	3.61	5.2	3
South Africa	31	45	17	7.81	2.2	3
Uganda	45.7	51.8	39.7	19.47	10.7	3

Source: Adapted from Obot, 2006

South Africa exhibits one of the most hazardous patterns of drinking and scores a three on the four point scale, along with many other African countries such as Botswana, Kenya and Uganda (Parry and Dewing, 2006). Adult alcohol prevalence in South Africa is only 31% (45% for males and 17% for females). Recorded consumption in South Africa is estimated to be around 7.81 litres of pure alcohol per capita, with unrecorded consumption around 2.2 litres of pure alcohol (Obot, 2006). A hazardous pattern of drinking, with a point score of 3, can be seen across many African countries, especially the Africa E group (See Appendix 2 for a list of countries in each WHO region)

Taking into account recorded and unrecorded consumption, the greatest amount of alcohol is consumed in Eastern Europe, especially in Russia (Europe C), the established market economies in Western Europe (Europe A) and North America (America A). The lowest amount of alcohol per resident is consumed in the Eastern Mediterranean and Southeast Asia D, dominated by India. The Africa E region, including South Africa, is seen to have the highest levels of alcohol consumption with 16.6 litres of pure alcohol consumed per drinker per annum. Furthermore the pattern of drinking in the Africa E region scores a 3.1, implying that there is greater harm per litre of alcohol consumed than in other regions.

TABLE 3: CHARACTERISTICS OF ADULT ALCOHOL CONSUMPTION IN DIFFERENT REGIONS OF THE WORLD 2000 (POPULATION WEIGHTED AVERAGES)

WHO REGION	Beverage type mostly consumed	Total cons.[1]	% Unrecorded of total	% heavy drinkers[2]	% drinkers among males	% drinkers among females	Cons. per drinker[3]	Average drinking pattern[4]
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Africa D (e.g. Nigeria, Algeria)	Mainly other fermented beverages	4.9	53	5.3	47	27	13.3	2.5
Africa E (e.g. Ethiopia, South Africa)	Mainly other fermented beverages and beer	7.1	46	10.3	55	30	16.6	3.1
Europe A (e.g. Germany, France, UK)	Wine and beer	12.9	10	15.7	90	81	15.1	1.3
Europe B (e.g. Bulgaria, Poland, Turkey)	Spirits	8.3	41	8.8	72	52	13.4	2.9

WHO REGION	Beverage type mostly consumed	Total cons.[1]	% Unrecorded of total	% heavy drinkers[2]	% drinkers among males	% drinkers among females	Cons. per drinker[3]	Average drinking pattern[4]
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Europe C (e.g. Russian federation, Ukraine)	Spirits	13.9	38	18.6	89	81	16.5	3.6
Americas A (Canada, Cuba, USA)	>50% of consumption is beer, about 25% spirits	9.3	11	11.2	73	58	14.3	2.0
Americas B (Brazil, Mexico)	Beer, followed by spirits	9.0	30	9.1	75	53	14.1	3.1
Eastern Mediterranean B (e.g. Iran, Saudi Arabia)	Spirits and beer, but scarce data	1.3	34	1.5	18	4	11.0	2.0
Eastern Mediterranean D (e.g. Afghanistan, Pakistan)	Spirits and beer, but scarce data	0.6	56	0.1	17	1	6.0	2.4
Southeast Asia B (e.g. Indonesia, Thailand)	Spirits	2.0	27	0.9	26	4	12.9	3.0
Southeast Asia D (e.g. Bangladesh, India)	Spirits	2.0	79	0.9	26	4	12.9	3.0

Source: Rehm et al., 2003

[1] Estimated total alcohol consumption per resident aged 15 and older in litres of absolute alcohol (recorded and unrecorded) per year. The unrecorded percentage can be seen in column 4

[2] Estimated % rate of heavy drinking (males 640 g and females 620 g per week) among those aged 15+.

[3] Estimated total alcohol consumption (in litres of absolute alcohol) per adult drinker per year.

[4] Estimated average pattern of drinking (1–4, with 4 being the most hazardous pattern).

Since the study by Rehm et al., 2003 the World Health Organisation (WHO) has modified the original (1-4) indicator and added a score of 5 to indicate countries where more than 2/3 of the alcohol is consumed in heavy drinking occasions. The most risky patterns of drinking prevail in Kazakhstan, Mexico, the Russian Federation, South Africa and the Ukraine (WHO, 2011).

Heavy episodic drinking (HED) is another measurable pattern of alcohol consumption risk. The WHO defines HED as drinking at least 60 grams or more of pure alcohol on at least one occasion in the past seven days. Heavy episodic drinking is more prominent in countries with middle to high per capita consumption, such as in Brazil and South Africa. There are also differences among countries with similarly high adult per capita alcohol consumption, indicating that higher levels of adult per capita consumption can be driven by more moderate drinking patterns, such as those found in France (WHO, 2011). These statistics indicate that South Africa has one of the world's highest patterns of drinking and HED, which is reflected in the high 'pattern of drinking' score. These statistics reveal that South Africa will experience negative externalities caused by alcohol to a greater measure and will have to engage more resources to mitigate these effects.

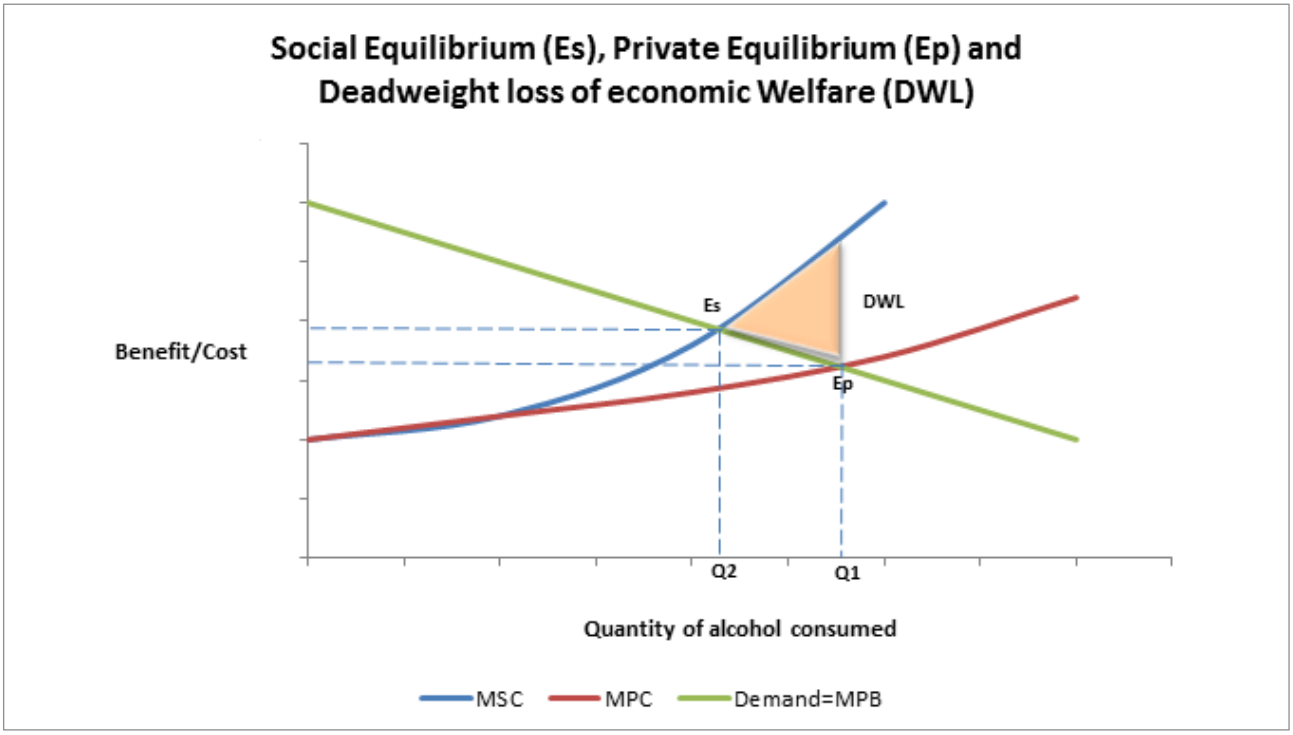
3. EXTERNALITIES: AN OVERVIEW

Alcohol abuse generates costs in addition to the value of resources used to produce and distribute alcohol. Some of these abuse costs are internal (borne by the abuser) and some are external (inflicted on others). Internal costs take various forms, such as increased medical expenses, lost income, increased health and automobile insurance premiums, and the pain, discomfort, and emotional and physical stress associated with excessive use of alcohol (Pogue and Sgontz, 1989).

A negative externality is defined as a spill-over of an economic transaction that negatively impacts a third party. In the case of alcohol consumption, the consumer bears no costs for their impact on society, while those negatively affected through health and social harm receive no compensation. The private cost is defined as the total cost incurred by the individual purchasing the product and the social cost is the private cost plus the externality. A negative externality occurs when the marginal social cost (MSC) is greater than the marginal private cost (MPC). In the case of alcohol, the MSC may be equal to the MPC until a certain threshold of consumption is realised (Freebairn, 2010). The external costs associated with moderate consumption may be close to zero due to the MSC being equal to the MPC.

When the marginal social cost is greater than the marginal private cost there is inefficiency in that the consumer does not bear the cost of consumption decisions. When externalities are present, market prices fail to signal correctly the complete cost of goods or services, resulting in a misallocation of resources. The external costs of alcohol consumption include direct externalities experienced by others, such as the harm that drunk drivers cause others, and collective resource costs, such as the cost of publicly funded medical treatment for alcohol-attributable conditions and of policing (Crawford, 2008).

FIGURE 1: *THE SOCIAL EQUILIBRIUM OF ALCOHOL CONSUMPTION*



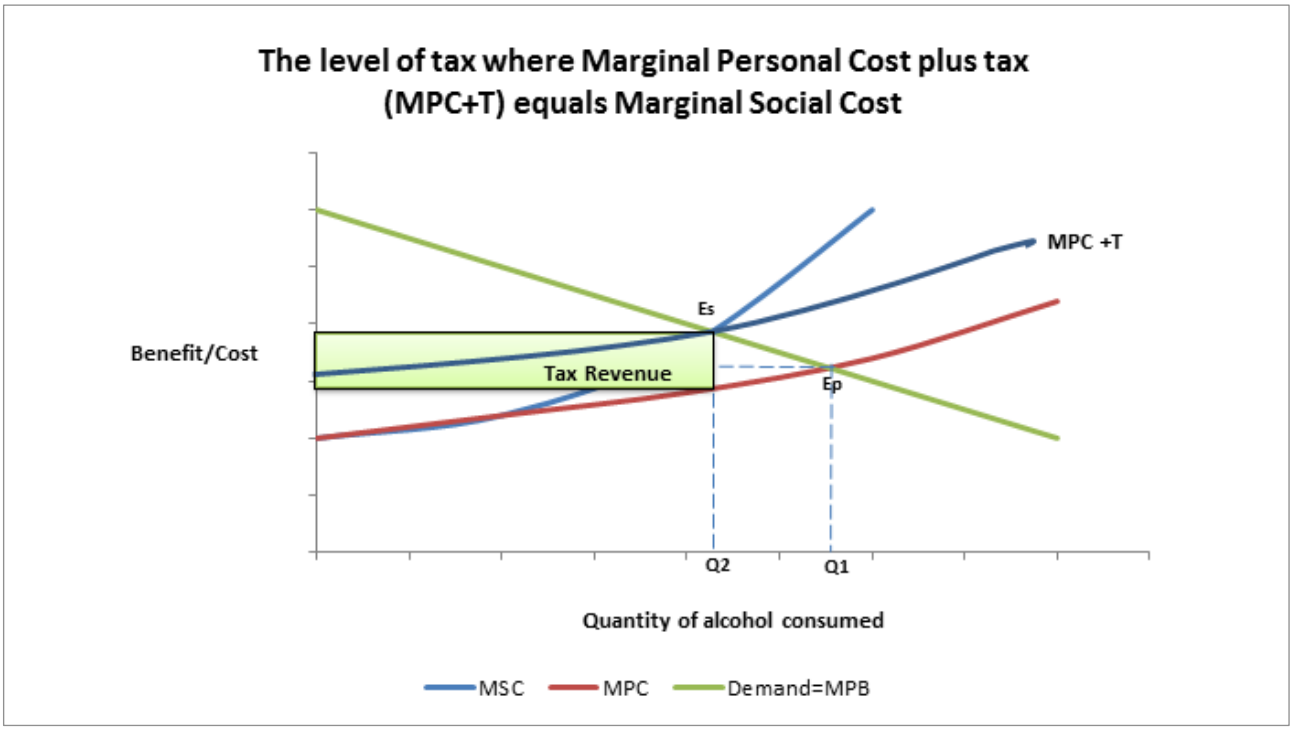
Source: own calculations

The graph above shows the marginal private cost (MPC) and the marginal social cost (MSC) for alcohol, beginning with a gentle upwards slope. The MSC increases sharply as quantities increase, whereas the MPC

has a gentler slope with increasing quantities. The MPC of consuming a certain amount of alcohol is therefore lower than the MSC, which means that those who consume alcohol are not being held accountable for the full consequences of their actions. Therefore, the market equilibrium will be established at the private equilibrium (Ep), and the drinkers will drink at a quantity of Q1, a higher quantity than the socially optimum Q2. This graph also shows the inefficiency of the free market. The triangle formed at DWL represents the deadweight loss of economic welfare that would have been incurred by society if no regulation was put in place. The difference between the marginal social cost and the marginal private cost is the negative externality of alcohol. Government inaction would also mean that individuals have no incentive to drink less.

Individual consumption choices do not reflect direct externalities or marginal social costs that are a result of excessive consumption. Excise taxes and regulation are ways of confronting consumers with these costs. The case for using policy instruments such as taxes to discourage socially harmful activities was set out by Pigou (1920) and has been developed and sometimes combined with other intervention or regulation (Crawford, 2008). Pigou suggested that where market prices do not reflect the social cost of a good, tax could be used to raise the marginal cost of consuming the good to the social marginal cost.

FIGURE 2: *THE EFFECT OF TAXES ON THE QUANTITY OF ALCOHOL CONSUMED*



Source: own calculations

With a Pigovian tax, the market failure is corrected by taxing consumers at a rate proportional to their consumption level, leading to an internalization of the costs related to the externality. This creates inefficiency problems with regard to alcohol as the externality is not always proportionate to the level of consumption. The graph above shows that the tax has increased the cost of alcohol consumption at every quantity, to the point that the sum of marginal private cost and tax is equal to the marginal social cost at equilibrium (Es). This method of levying an excise tax on alcohol not only lowers the quantity consumed (from Q_1 to Q_2), but it also increases government tax revenue by the area of the shaded rectangle. The trick is to choose the level of tax such that the price of alcohol (tax inclusive) is equal to MSC.

4. A CATEGORISATION OF ALCOHOL COSTS

Policymakers primarily focus on the quantifiable financial costs of alcohol, which exclude non-financial welfare costs. Moller and Matic (2010) recommend that full economic welfare costs and total financial costs should be presented separately, with consistent distinctions for internal and external costs. They provide a framework in their paper for assigning external and internal categories for health, crime, productivity and non-financial welfare costs. This categorisation was adapted by DNA (2011) to resemble Table 4 here:

TABLE 4: *INTERNAL AND EXTERNAL COSTS OF HARMFUL ALCOHOL USE BY THE DRINKER*

COSTS	PRIMARILY EXTERNAL OR INTERNAL	COMMENTS
Health and Crime costs		
Health care	External	Internal when health care is paid for by the individual
Treatment for alcohol use disorders	External	
Research and prevention	External	
Social security	[External]	A transfer cost so not excluded in the total social cost
Drink-driving damage	External	
Labour costs		
Productivity at work	?	Contentious among economists
Absenteeism	?	Contentious among economists
Premature mortality	?	Contentious among economists
Unemployment/Retirement	External	Internal if estimating lost earnings to the drinker
Crime: Imprisonment	Internal	External if estimating cost to society of maintaining prisons
Congestion from accidents	External	
Non-financial welfare costs		
Health	Internal	
Non-health impacts on drinkers	Internal	
Drinkers' relatives: quality of life	External	Considered by some economists to be an internal cost but seems better to treat as an external
Drinkers' relatives: Informal care	External	Considered by some economists to be an internal cost but seems better to treat as an external
Drinkers' relatives: children	External	Considered by some economists to be an internal cost but seems better to treat as an external

Source: DNA, 2011 with adjustments

This table shows the internal and external costs to the drinker. Harm to others involves all external costs e.g. crime, health care, social services. Both costs to the drinker and costs to others should be considered within the different categories and quantified where possible.

5. THE IMPACT OF ALCOHOL USE ON HEALTH AND CRIME

The World Health Organisation has defined the Disability Adjusted Life Year as the sum of years of potential life lost due to premature mortality and the years of productive life lost due to disability (WHO, 2013). Alcohol accounted for 5.7% of all South African DALYs in (IHME, 2010). The net effect of alcohol consumption on health is damaging, with an estimated 3.8% of all global deaths and 4.6% of global DALYs attributable to alcohol (Rehm et al., 2009b). Most of the global deaths caused by alcohol were in the broad categories of most important diseases causally affected by alcohol (Rehm et al., 2009b).

In the South African study by Schneider et al. (2007), it was found that alcohol contributed to eighteen 'health outcomes' from the International Classification of Disease (ICD-10). Schneider et al.'s study is by no means exhaustive and focuses on the most important health issues associated with alcohol use in the South African context, illustrated by the fact that they identify only two wholly alcohol-attributable conditions, whereas Rehm et al. (2010) identifies 30 wholly alcohol-attributable conditions.

5.1 CHRONIC CONDITIONS

Certain chronic conditions like cancer can become worse with alcohol use, whereas other conditions such as type 2 diabetes can be improved by moderate alcohol use (see appendix 3). The attributable burden of alcohol is estimated by the Institute for Health Metrics and Evaluation by comparing the current alcohol consumption of the population with the counterfactual situation of no consumption and the Relative Risk (RR) of disease. The RR for type 2 diabetes for males and females is less than 1, together with haemorrhagic stroke and ischaemic stroke for females, indicating that alcohol consumption has beneficial effects for these conditions (Schneider, 2007).

TABLE 5: ESTIMATED ALCOHOL ATTRIBUTABLE FRACTIONS BY AGE GROUP, SOUTH AFRICA 2010

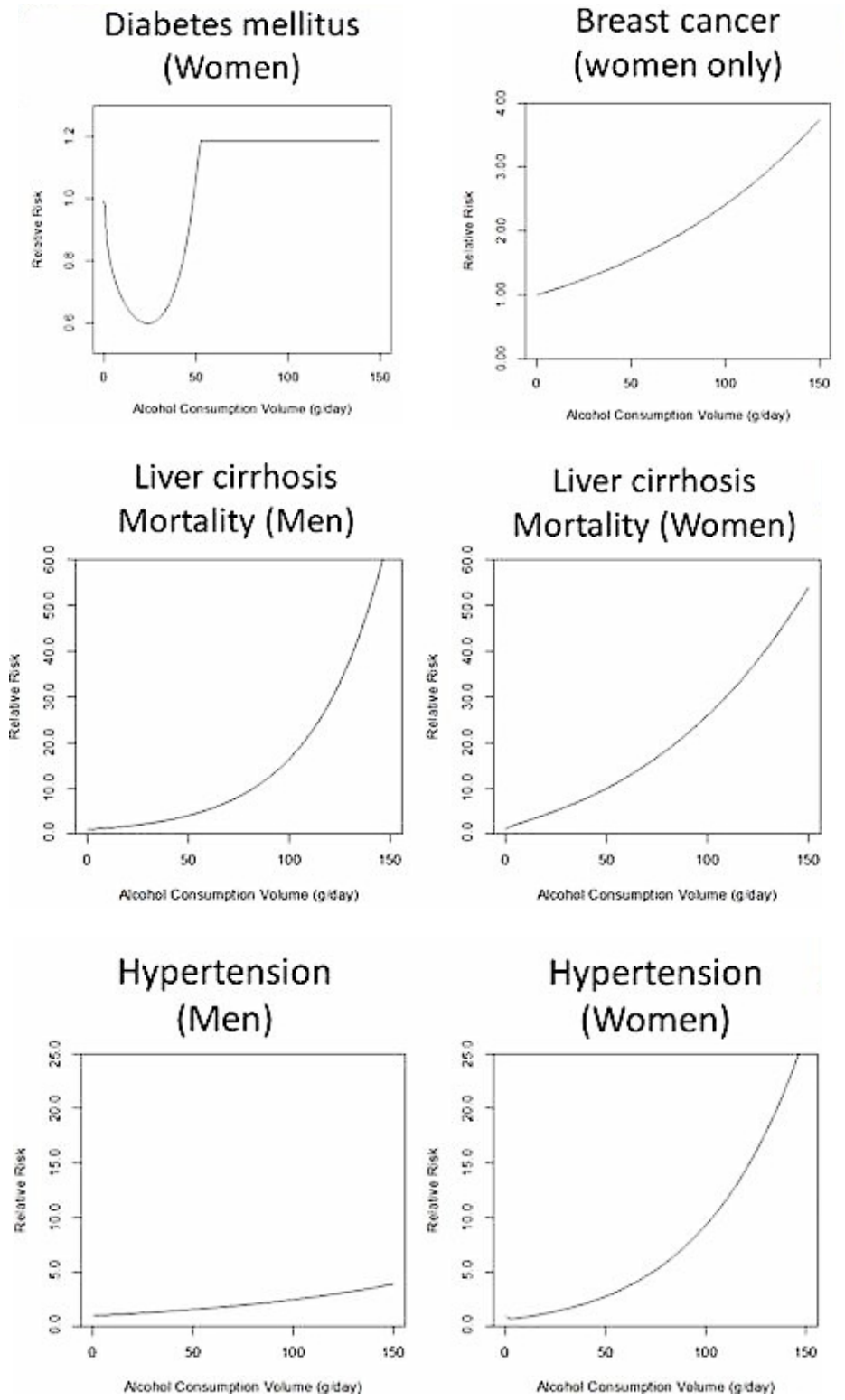
DISEASE	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80+
Cancer mouth	0.37	0.33	0.36	0.36	0.41	0.40	0.43	0.44	0.42	0.42	0.25	0.25	0.23	0.21
Cancer esophagus	0.22	0.19	0.22	0.23	0.23	0.24	0.25	0.27	0.26	0.26	0.14	0.14	0.14	0.12
Cancer liver	0.11	0.11	0.12	0.12	0.12	0.12	0.12	0.13	0.12	0.12	0.07	0.07	0.07	0.06
Cancer larynx	0.25	0.25	0.28	0.26	0.26	0.29	0.30	0.30	0.30	0.30	0.17	0.18	0.17	0.17
Nasopharynx cancer	0.36	0.34	0.39	0.37	0.37	0.39	0.39	0.42	0.41	0.40	0.23	0.24	0.22	0.18
Female breast cancer	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.10	0.05	0.05	0.05	0.05
Epilepsy	0.21	0.21	0.23	0.24	0.24	0.24	0.25	0.25	0.25	0.25	0.13	0.13	0.12	0.11
Hypertensive disease	0.23	0.23	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.09	0.09	0.08	0.08
Ischaemic Heart Disease (IHD)														0.01
Ischemic Stroke	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.02	0.02	0.01	0.01
Cirrhosis - liver	0.65	0.65	0.67	0.68	0.69	0.69	0.69	0.70	0.69	0.68	0.48	0.48	0.48	0.47
Alcohol use	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Diabetes*				-.06	-.06	-.06	-.05	-.05	-.05	-.04	-.04	-.04	-.04	-.04
Stroke benefit*				-.08	-.08	-.08	-.08	-.08	-.08	-.07	-.07	-.06	-.06	-.06
IHD benefit*	-.11	-.11	-.11	-.09	-.09	-.09	-.09	-.09	-.09	-.03	-.03	-.04	-.04	-.04

Source: IHME, 2013

The table above shows the South African Alcohol Attributable Fractions (AAFs) across different and age groups, that is, the percentage of DALYs for that particular disease that can be attributed to alcohol. It can be seen that for most of the chronic conditions that cause harm, the AAFs begin between the ages of 15 and 19 years and they become incrementally higher until the ages 50-54 years where they peak and thereafter become incrementally lower until they reach 80 years and above. The AAFs are higher for males across all age groups for all chronic health categories other than female-specific conditions such as breast cancer (Schneider, 2007). The chronic conditions with the highest AAFs include cirrhosis of the liver reaching 70% AAF (50-54yrs), cancer of the mouth reaching 44% AAF (50-54yrs) and nasopharynx cancer reaching 42% AAF (50-54yrs). Some benefits can be seen for diabetes, stroke and Ischaemic Heart Disease (IHD). The benefits generally decrease incrementally as age increases.

Table 5 gives a very general overview of the RRs and one should further take into account gender and the volume of alcohol consumed, for example, stroke benefits are at least 6 times greater in women (Schneider, 2007). Shield, Parry and Rehm (2012) provide graphs for the relationship between increasing amounts of average daily alcohol consumption and the RR for certain diseases for men and women. Some of these graphs are presented below.

FIGURE 3: *THE CHANGE IN RELATIVE RISK WITH INCREASING ALCOHOL CONSUMPTION*



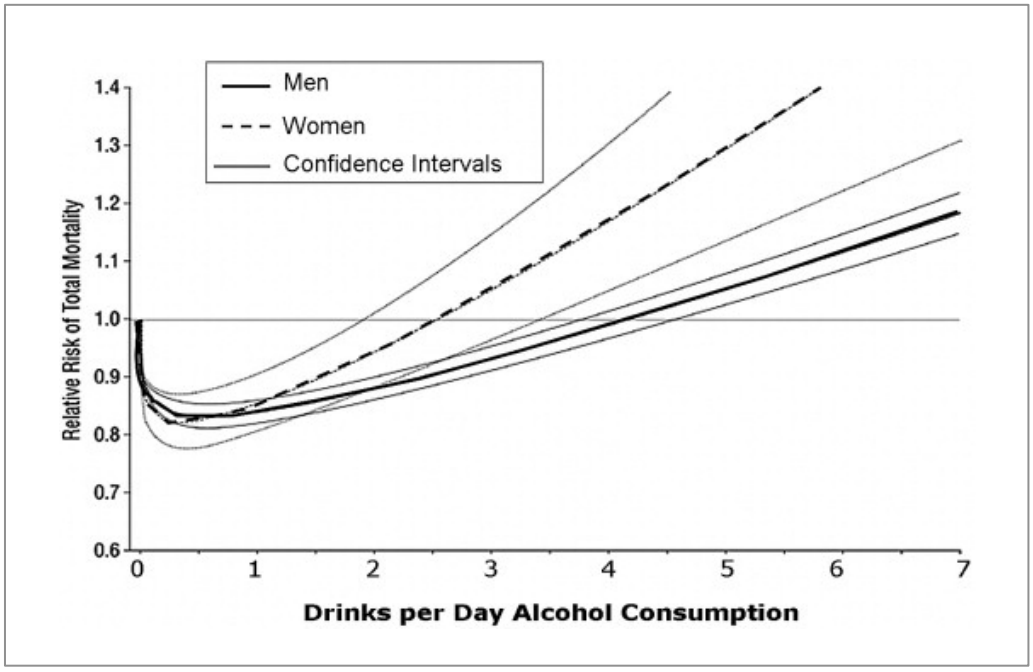
Source: Shield, Parry and Rehm (2012)

The graphs in Figure 3 show a decrease in the RR of diabetes mellitus up to a BAC of around 50g/day, thereafter the RR increases and remains at 1.2. For breast cancer, liver cirrhosis and hypertension the RR increases as the alcohol consumption increases; however, the RR for liver cirrhosis in men increases at a faster rate than for women. This trend is reversed for hypertension where women experience higher RRs than men at the same level of consumption.

5.2 THE DEMOGRAPHICS OF HEALTH IMPACTS

The J-curve in Figure 4 shows that light to moderate drinkers experience less risk than abstainers and heavy drinkers are at the highest risk. DiCastelnuovo and Castanzo (2006) show the results from a meta-analysis of over one million individuals where the consumption of one drink daily by women (13g to 15g alcohol) and one or two drinks daily by men was associated with a 18% reduction in total mortality. Moderate alcohol consumption can confer cardio-protection and benefits people with cardiovascular conditions, diabetes and metabolic syndrome through improvements in insulin sensitivity and high-density lipoprotein cholesterol. However, the results also show that an intake of more than 2 drinks per day for women and 3 drinks per day for men is associated with increased mortality in a dose-dependent fashion. Binge-drinking, even among otherwise light drinkers, increases the likelihood of cardiovascular disease and all-cause mortality (O'Keefe et al., 2007). O'Keefe et al. (2007) recommend that although this J-curve shows benefits for moderate drinkers, alcohol should not be universally prescribed for health enhancement for nondrinking individuals because of the potential for problem drinking.

FIGURE 4: *ALCOHOL AND ALL-CAUSE MORTALITY*



Source: DiCastelnuovo and Castanzo, 2006

In Rehm's (2009b) study of the global burden of disease (GBD), restricted to GBD disease categories, he finds that the net negative effect of alcohol is greater in people below the age of 60. Around 5% of deaths in people younger than 60 years were attributed to alcohol compared to only 3.8% across all age groups. This effect is mainly due to injuries caused by alcohol in younger age groups and beneficial effects detected in older age groups (Rehm, 2009b). Ten times more males than females die from alcohol-attributed causes, and more than five times more males suffer from alcohol-related diseases (Remmington, 2010).

The table below shows the overall Alcohol Attributable Fractions (AAFs) of different diseases; the AAF in this table is the percentage of deaths caused by a particular disease that can be attributed to alcohol. The table also looks at the number of deaths, years of life lost due to premature mortality (YLLs), years of life lived with disability (YLDs) and disability adjusted life years (DALYs) for each selected outcome. The table lists chronic and alcohol-attributable conditions.

TABLE 6: AN OVERVIEW OF THE NEGATIVE EFFECTS OF ALCOHOL ON CHRONIC DISEASES AND ALCOHOL ATTRIBUTED DISEASE IN SOUTH AFRICA IN 2010

DISEASE	AAF (%)	Deaths	YLLs	YLDs	DALYs
Cancer mouth	35%	297	8898	263	9161
Cancer oesophagus	20%	752	21 263	148	21 410
Cancer liver	35%	185	5885	36	5922
Cancer larynx	25%	125	3538	85	3623
Nasopharynx cancer	33%	34	1172	13	1184
Female breast cancer	7%	186	5606	262	5868
Epilepsy	21%	812	35 334	16 398	51 732
Hypertensive disease	13%	1311	34 785	2379	37 164
Ischaemic Heart Disease (IHD)	0.60%	102	1183		
Ischemic Stroke	2.50%	250	6518	186	6704
Cirrhosis - liver	63%	2064	72 454	1307	73 761
Alcohol use disorders/dependence	100%	595	21 388	98 836	120 223
Fetal Alcohol Syndrome (FAS)	100%	0	0	62 466	62 466

Source: IHME, 2013 & Schneider, 2007

Chronic diseases with an AAF of greater than 30% include cirrhosis of the liver, cancer of the liver, nasopharynx cancer and cancer of the mouth. Chronic diseases that caused over 1000 deaths in 2010 were hypertensive disease and cirrhosis of the liver. The highest YLLs and YLDs for chronic conditions were found for epilepsy, hypertensive disease and cirrhosis of the liver. Fetal alcohol syndrome and alcohol use disorders have the highest YLDs and DALYs of 98836 and 120223 for alcohol dependence and 62466 and 62446 for FAS.

FAS is a pattern of birth defects due to excessive alcohol consumption in pregnancy and it is characterized by certain facial features, growth retardation and neurological and developmental disabilities. South Africa has the highest reported incidence of FAS in the world, and in some areas up to 12% (120 in 1000) people are born with FAS (Schneider, 2007). These FAS rates in South Africa are up to 141 times greater than those in the United States. This is underscored in South Africa by the historical presence of the wine industry, particularly the 'dop' system and the culture of hazardous drinking, particularly heavy episodic use. In the literature on alcohol abuse, heavy-drinking women often live with alcoholic males, have alcohol-abusing parents, initiate drinking at an early age and take other drugs (Schneider, 2007). These factors demonstrate that FAS is linked to complex social problems in South Africa.

5.3 ACUTE CAUSES: INTENTIONAL AND UNINTENTIONAL INJURY

Most relationships between chronic diseases and alcohol depend on biochemical processes linked to average volume consumption over time. The negative externalities from chronic diseases are more stable across countries, whereas the transferability of risk relations between injury and alcohol is more context-dependant (Remington, 2010). Almost half of the global burden of alcohol related mortality (46% of 3.8%) is related to acute causes, intentional and unintentional injury being the most important (Remmington, 2010).

In South Africa, road traffic mortality and homicide rates are 1.5 and 5 times higher than global averages respectively (Norman, 2007). The abuse of alcohol is associated with an increased risk of injury in road traffic accidents (involving vehicles, bicycles and pedestrians), domestic violence, falls, fires, drowning, homicides, suicides, assault etc. Studies relating the average volume of drinking to the risk of injury have found that these are positively related, with an increasing intake of alcohol increasing risk, even at low levels (Ezzati et al., 2002). Africa's burden of disease for injury is around 60% higher than the global average, with the WHO estimating that injuries will rank as the second major contributor to African mortality by 2020 (WHO, 1999 in Matzopoulos, 2005).

There are clear biological reasons why alcohol use is related to injury. Moderate doses have been shown to have cognitive and psychomotor effects that are relevant to the risk of injury, such as reaction time, cognitive processing, coordination and vigilance (Eckardt in Remmington et al., 2010:1043). The threshold dose for negative effects on psychomotor tasks is a blood alcohol content (BAC) of around 0.05g/100ml (Remmington et al., 2010:1043).

With regard to intentional injury, Graham and West (2001) find a strong association between alcohol and violent crime, although the association varies across settings. Studies on violence have shown that alcohol consumption often precedes violent events and that the average amount of alcohol is linked to the severity of the violence (Remmington et al., 2010:1046). There are a number of different factors that causally implicate alcohol use in aggressive behaviour. Alcohol has an effect on the serotonin (5HT) and GABA brain receptors, which may lead to a reduced level of fear about the social, physical or legal consequences of one's actions. Alcohol also affects cognitive functioning, leading to impaired problem-solving in conflicts and overly emotional responses (Peterson et al., 1990). Other behavioural effects related to violence and aggression are 'alcohol myopia,' a narrow and tenacious focus on the present, as well as increased concerns about demonstrating personal power (Remmington et al., 2010).

Alcohol is also an important situational risk factor associated with intentional injury, namely interpersonal violence and suicide (Krug et al., 2002). Rehm (2003b), concludes further that there is a causal link between alcohol consumption and both interpersonal violence and suicide. Parry and Dewing (2006) consolidate many South African studies and find that alcohol use contributes to between 27% and 47% of intentional injuries.

TABLE 7: SUMMARY OF ALCOHOL RELATED CRIME AND INJURY IN SOUTH AFRICA

Crime or Injury	Percentage of offenders tested positive for alcohol consumption	Original Sources
Sexual offence	3.8%-9.1%	Crime Information Analysis Centre, 2001
Serious assault	40% believed positive for alcohol or drugs	Omar, 2004
Weapon related offences	25%	(Parry et al., 2004) Cape Town, Durban and Johannesburg only
Trauma patients	39%	(Pludderman et al., 2004) Cape Town, Durban and Port Elizabeth only
Assault cases	14%	(Parry et al., 2004) Cape Town, Durban and Johannesburg only
Homicide	51%	Non-Natural Mortality Surveillance System (NNMSS)
Murder	17%	(Parry et al., 2004) Cape Town, Durban and Johannesburg only
Suicide	35%	NNMSS (Matzopoulos, 2005)
Burns	60%	NNMSS (Matzopoulos, 2005)
Robbery	10%	(Parry et al., 2004) Cape Town, Durban and Johannesburg only
Housebreaking	22%	(Parry et al., 2004) Cape Town, Durban and Johannesburg only
Motor vehicle theft	12%	(Parry et al., 2004) Cape Town, Durban and Johannesburg only
Road Traffic Injuries	41%	(Schneider et al. 2007)
Transport fatalities	53% Pedestrians 61% Drivers 58% Cyclists 40%	NNMSS (Matzopoulos, 2005)
Interpersonal violence	61%	(Schneider et al., 2007)
Domestic violence	70%	(Peden et al., 1995) Cape Metropole only
Domestic violence	49%	(Parry et al., 2004) Cape Town, Durban and Johannesburg only
Rape	22%	(Parry et al., 2004) Cape Town, Durban and Johannesburg only
Drowning	40%	NNMSS (Matzopoulos, 2005)

Source: Parry and Dewing, 2006, DNA, 2011

Schneider et al. (2007) calculated alcohol attributable fractions (AAF) for injury, mortality and morbidity using the South African injury mortality surveillance data for 2000. These fractions were calculated based on the percentage of fatal injuries that tested positive for a Blood Alcohol Concentration (BAC) of 0.05g/100ml or above. The AAF for interpersonal violence was found to be 61%. This fraction lies between the estimates of Parry et al. (2004) and Peden et al. (1995), tabulated above, for domestic violence. Schneider et al.'s study recorded an AAF for road traffic injuries attributed to alcohol of 41%, lower than the 53% found for transport fatalities by Matzopoulos (2005) above, indicating that the severity of accidents increases with alcohol consumption.

The global study conducted by Rehm et al. (2009) found that on the whole the AAFs for intentional injuries were 29% for DALYs and 39.5% for mortalities. In the case of unintentional injuries, the range was between 31.5% for DALYs and 35.6% for deaths. The South African data suggests that the PAFs (Population Attributable Fractions) for intentional and unintentional injury are higher than these global ranges.

TABLE 8: AN OVERVIEW OF THE NEGATIVE EFFECTS OF ALCOHOL ON INTENTIONAL AND UNINTENTIONAL INJURY: SOUTH AFRICA 2000

Injury	PAF (%)	Deaths	YLLs	YLDs	DALYs
Road Traffic Injuries	43.9	6166	154 319	8031	162 350
Poisonings	28.4	114	2848	0	2848
Falls	14.7	204	3858	2662	6520
Fires	49.4	1648	38 925	6149	45 074
Drowning	50.8	252	6615	0	6615
Other unintentional injuries	4.8	70	1857	4895	6752
Suicides	32.3	1674	42 218	16	42 235
Homicide and Violence	43.9	12 741	361 437	79 967	441 405

Source: Schneider, 2007

Acute conditions with a PAF of greater than 40% include Road Traffic Injuries (RTI), fires, homicide and violence, and drowning. Acute conditions that cause over 2000 deaths per annum include RTIs and homicide and violence. However, the YLLs that follow from the deaths in acute conditions are much greater than those for chronic diseases as most of the injuries occur at a younger age. The conditions that reflect YLLs above 24000 include RTIs, fires, suicides and homicides and violence. The homicides and violence category has the highest number of deaths, YLLs, YLDs and DALYs.

Some of the risks associated with alcohol are immediately reversible, for example all acute risks can be completely reversed if alcohol is removed. Chronic diseases, however, often depend on lifetime exposure and therefore the associated risk is often reduced but not eliminated by the removal of alcohol. There are however some chronic diseases with rapid or immediate remission such as liver cirrhosis and depression.

5.4 INFECTIOUS DISEASES

A notable omission from Schneider's analysis on the burden of alcohol abuse in South Africa is that of communicable diseases. In the South African context, the most notable are HIV/AIDS and tuberculosis (TB). The link between alcohol use and infectious diseases is becoming a more prominent area of research, especially in Africa, and focuses on direct and indirect causation. The table below gives a breakdown of the Alcohol Attributable Fractions (AAFs) for infectious diseases. This means that of all DALYS attributed to alcohol in males, 26% are due to alcohol-related TB and 9.7% due to alcohol-related HIV. Similarly, of all DALYS attributed to alcohol in females, 10% are due to alcohol-related TB and 27.8% due to alcohol-relate HIV.

TABLE 9: INFECTIOUS CONDITIONS ATTRIBUTABLE TO ALCOHOL USE IN SOUTH AFRICA (DALYS)

Infection	Male AAF (%)	Female AAF (%)	Male (1000 DALYs)	Female (1000 DALYs)	Total (1000 DALYs)
Tuberculosis (2010)	26	10	155	27	183
HIV/AIDS (2004)	9.7	27.8	102	71	173

Source: IHME, 2013 & Rehm et al., 2009

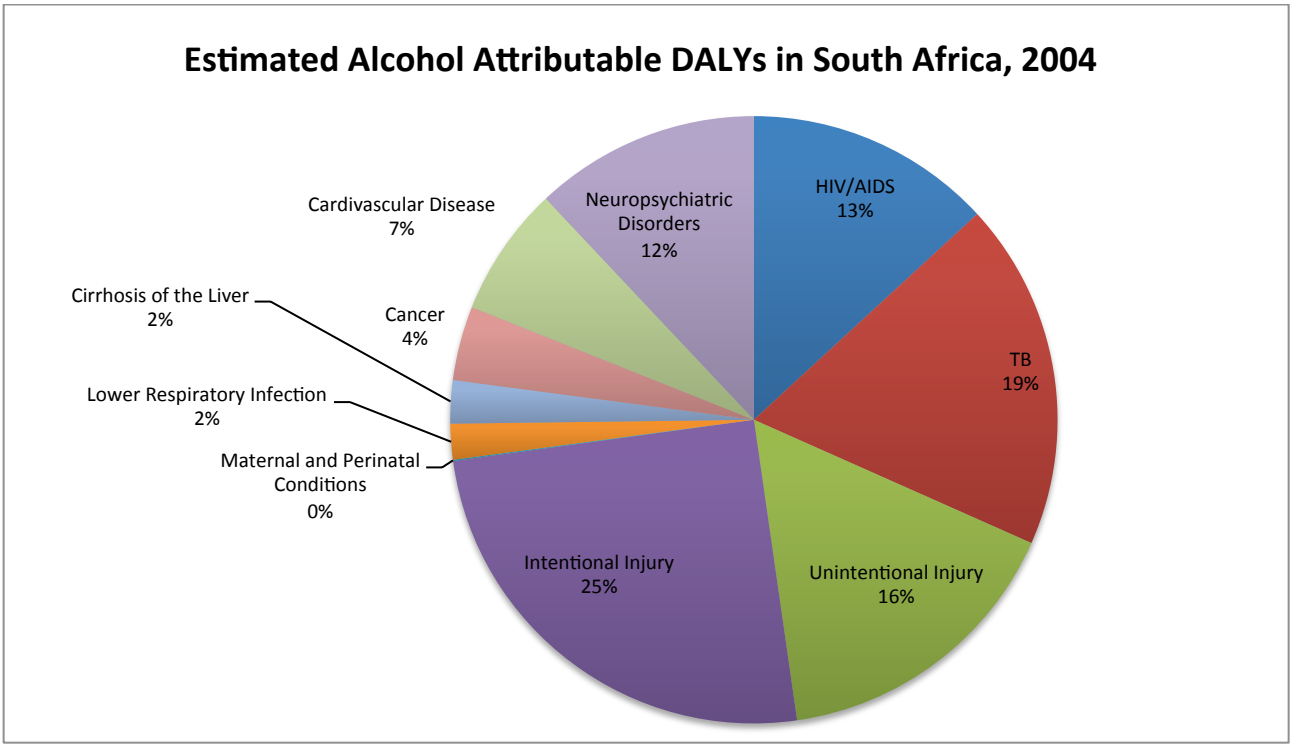
Sub-Saharan Africa has 67% of global HIV infections. In South Africa alone, there were an estimated 270 000 deaths due to AIDS in 2011 (UNAIDS, 2013). Individual studies and a meta-analysis by Fisher et al. (2007) point to a variety of links between HIV risk behaviours and problematic alcohol use. The relative risk (RR) is between 1.6 and 2 times greater for problem drinkers than for non-drinkers. Parry et al. (2010) find conclusive evidence of a causal linkage between heavy drinking patterns and alcohol-use disorders and the worsening of the disease course for HIV. However, further research needs to be done on the suspected links between alcohol consumption and the prevalence and incidence of HIV. Abnormalities in T and B lymphocytes, depression of CD4 count, and decreased lymphocyte function to produce Interleukin-2 have all been implicated in the biological effect of alcohol on the incidence and severity of HIV/AIDS. The causality, however, is not clear, as personality variables could affect both alcohol consumption and unsafe sex practices (Rehm & Parry, 2009). Hendershot et al. (2009) find that alcohol use was associated with substantially lower adherence to antiretroviral therapy, in a dose-dependent manner. In this way alcohol seriously affects HIV mortality. Interestingly, the AAF for HIV is almost three times as much for females (27.8%) as it is for males (9.7%) whereas the DALYs are greater for men (102 000 vs 71 000).

The UNAIDS and World Health Organisation (2009) estimate that about 1% of South Africans (roughly 490,000) contracted Tuberculosis (TB) in 2008, giving an incidence rate of 949 TB cases per 100 000 population. Heavy alcohol use has been causally linked to TB, resulting in a threefold increase in the Relative Risk of TB (Rehm & Parry, 2009). South Africa has one of the five highest AAFs for TB, together with countries like Russia and Nigeria. The AAFs for TB are 26% for males and 10% for females with corresponding DALYs of 155 000 and 27 000 respectively. The table on the previous page shows that alcohol use was estimated to have been responsible for 356 000 DALYs lost in South Africa due to TB and HIV/AIDS.

5.5 OVERALL HEALTH EFFECTS

The pie chart below represents the percentage contribution of each disease to the total alcohol attributable DALYs in South Africa in 2004.

FIGURE 5: *ALCOHOL ATTRIBUTABLE DALYS FOR CHRONIC, ACUTE AND INFECTIOUS DISEASES*



Source Rehm, et al., 2009

The greatest alcohol-attrributable health effects are caused by acute conditions, comprising 41% of all alcohol attributable DALYs; this is followed by infectious diseases comprising 32% of alcohol-related DALYs and chronic diseases comprising 27% of alcohol-related DALYs. The DALY burden attributed to alcohol in South Africa is estimated to be around 7% of total DALYs, comparable to that of developed regions, owing to the high injury-related burden in South Africa (Schneider, 2007).

6. IMPACT OF ALCOHOL USE ON ECONOMIC DEVELOPMENT AND PRODUCTIVITY

Alcohol misuse can hinder the rate at which economic development occurs, through fiscal and productivity losses (Parry et al., 2003). This section will explore the direct costs to the economy and costs that can be quantified in the areas of health, social welfare, crime and accidents, as well as the effects on the labour supply and productivity.

6.1 DIRECT COSTS TO GOVERNMENT

Budlender (2010) analyses some of the direct costs to government of alcohol abuse in 2009-2010. Her estimates suggest that provincial governments allocated around R 7 billion because of alcohol use per year, whereas national government allocated more than R 10 billion. After deducting the income gained by government through VAT, excise tax and licensing she calculates a net expenditure of R 1 billion, but many costs were not quantified. A summary table of direct government costs attributed to alcohol use can be seen here:

TABLE 10: *SOME DIRECT COSTS ASSOCIATED WITH ALCOHOL ABUSE IN SOUTH AFRICA (2009-2010)*

Cost Category	R millions
National and Provincial Department of Health	6805
National Safety and Security	5808
Provincial Community Safety	44
Correctional Services	3355
National justice and constitutional Development	335
Substance abuse, prevention & rehabilitation	157
Disability grant	172
Service to persons with disabilities	6
HIV and AIDS	26
Care and Support services to families	34
Youth Development	2
Other costs attributed to alcohol to consider but not quantified in the study	
Prison programmes	
Traffic Management	
Community policing forums	

Source: Adapted from Budlender, 2010

The table on the previous page shows that the National and Provincial Departments of Health faced the greatest costs at around R6.8 billion, with safety and security following closely at R5.8 billion. Correctional services bore the third-largest cost, at R3.4 billion. Effective regulation has the ability to lower some of the budget allocations above and these regulations should be considered in light of their effectiveness.

6.2 COST OF PRODUCTIVITY

In terms of worker productivity, harmful alcohol use and episodic heavy drinking increase the risk of arriving at work late, leaving work early, disciplinary suspension and job turnover due to premature death (Anderson, 2010). They furthermore can lead to inappropriate behaviour, theft and other crime, poor co-worker relations and low company morale (DNA, 2011). Alcohol misuse also affects human capital formation as school-age adolescents tend to be absent, fail class and have an increased propensity to abuse other substances and engage in risky sexual behaviour (Harker et al., 2008). All of the above factors affect productivity, largely in a dose-response manner (Anderson, 2010).

Many of the variables linking alcohol misuse to labour supply and productivity, including hangovers and drunkenness, absenteeism, unemployment and early retirement, are difficult to quantify. In the DNA study (2011) the relationship between alcohol and wages is measured, where the wage is a proxy for productivity. In this study, an inverted U shape is found, where abstainers earn less than light or moderate drinkers who earn more than heavy drinkers. Another study conducted at 114 work sites of seven corporations in the U.S. showed an almost linear negative relationship between increasing average consumption and a summary measure of job performance, finding the strongest associations between consumption and getting to work late, leaving early, and doing less work, and only a weak association with missing days of work (Mangione et al., 1999). Regression analysis in South Africa shows that alcohol or drug-related problems are significant predictors of work performance. Furthermore, it was found that the more an employee abuses alcohol or drugs, the greater the impact on work performance (Harker-Burnhams et al., 2013). Overall, studies suggest that the reduction in productivity and performance follows increasing alcohol consumption.

6.3 ABSENTEEISM AND UNEMPLOYMENT

The relationship between alcohol use and absenteeism is complex. Moller and Matic (2010) suggest that with the limited research available one can assume that around 4%-6% of absenteeism is caused by the harmful use of alcohol. These figures, however, seem too low and Bacharach et al. (2011) propose that this relationship is likely governed less by the *amount* of alcohol consumed, and more by the *way* it is consumed. Their results indicate that the "frequency of heavy episodic drinking over the previous month is positively associated with the number of days of absence recorded in the subsequent 12-month period, whereas modal consumption (a metric capturing the typical amount of alcohol consumed in a given period of time) is not" (Bacharach et al., 2011). This indicates that the relationship between alcohol use and absenteeism in South Africa will be much stronger than in other countries or regions, as South Africa has one of the highest hazardous patterns of drinking and heavy episodic drinking levels in the world.

Factors related to alcohol misuse can also affect employability. Some of these factors include previous addicts who are disadvantaged by time spent out of the labour force and people with alcohol-related morbidity (for example Foetal Alcohol Syndrome and alcohol-related injuries) who cannot perform certain functions in the competitive labour force. Some studies have found that abstainers are more likely to be unemployed than moderate drinkers. This complicates the analysis of causality as abstainers could also

include recovering alcoholics (DNA, 2011). Further studies should be conducted in South Africa on the effect of alcohol use on unemployment and early retirement.

The harmful use of alcohol can reduce the amount of time that people spend at work and their related productivity. Examples of these costs include delays in getting to work because of alcohol-attributable traffic accidents or time spent incarcerated for crimes committed under the influence of alcohol. Lastly, time spent caring for people with alcohol-attributable health problems can also reduce the amount of time people spend in the workforce (DNA, 2011).

TABLE 11: THE CONSEQUENCES OF ALCOHOL CONSUMPTION RELATED TO PRODUCTIVITY

A LIST OF FACTORS AFFECTING PRODUCTIVITY (COSTS UNCERTAIN)
Absenteeism
Job turnover due to premature death
Inappropriate behaviour e.g. theft and crime
Disciplinary action
Poor co-worker relations
Reduced company morale
Human Capital Formation
Arriving to work late and leaving early
Alcohol related morbidity e.g. FAS
Time spent caring for people with alcohol attributable health problems
People who have spent time out of the labour force due to alcohol related problems unable to find a job
Delays in getting to work due to alcohol attributable accidents
Time spent incarcerated due to crimes committed under the influence

Source: McCann et al. 2010

6.4 OTHER NON-FINANCIAL COSTS

Non-financial welfare costs are intangible costs, which are often estimated and listed separately from other tangible costs in a cost study. These costs are often incurred by those who do not misuse alcohol, because of the actions of those who do. These sources of displeasure include noise pollution, pain and suffering due to the death of a loved one from an alcohol-attributed crime or accident, being the victim of alcohol-induced crime etc. Other social welfare costs include the cost of alcohol tax evasion, alcohol-attributable litter, vandalism and fires.

7. POLICY CONSIDERATIONS

The rationale of government intervention in alcohol policy is to correct the market failure of excessive consumption from a social efficiency perspective. Potential market failures that have been discussed include the costs associated with healthcare, injury, crime and productivity. Other market failures include imperfect information by consumers about longer-term effects, habitual effects of excessive consumption of alcohol, and time inconsistency of individual decisions in purchasing alcoholic beverages (Freebairn, 2010). The South African Health minister, Aaron Motsoaledi, said in 2013 that the alcohol industry was contributing R19bn to the South African economy, but dealing with the fallout of alcohol abuse was costing taxpayers R39bn. The cost is more than double the benefit, requiring a government response to the risk factor (BDLive, 2013).

Because of the high social externalities of alcohol, government interventions are sought which will mitigate these effects, without adding to the costs. Government interventions are directed to three areas, namely towards those who drink alcohol (e.g. random breath testing), the alcohol itself (e.g. the legal age to drink alcohol is 18 and above) and the environment or the context in which alcohol is used. The environment includes accessibility and availability, through policy and legislative interventions such as the times at which alcohol is sold (Parry, Myers & Thiede, 2003). Barbor et al. (2003) recommend four distinct categories of intervention to address these externalities. These are:

- Policy and legislative interventions, including taxation on alcohol sales, drinking-driving laws, restricted licensing of outlets and advertising controls
- Law enforcement, for example random breath-testing of drivers
- Community interventions and
- Brief interventions

Schneider (2007) assesses the recommendations of Barbor (2003) and their likely effectiveness in the South African context. Barbor et al. (2003) found that mass media awareness campaigns were not very effective; therefore they are not included in the table below.

TABLE 12: POLICY INTERVENTIONS AND THEIR APPLICATION IN SOUTH AFRICA

SPECIFIC STRATEGY	EFFECTIVENESS	COST TO IMPLEMENT	TARGET GROUP	APPLICATION IN SOUTH AFRICA
Regulating physical Activity				
Changes in minimum purchasing age	High	Low	B	Not feasible at present: rather enforce existing limits
Government monopoly on retail sales	High	Moderate to High	A	Not feasible to reintroduce this
Restrictions on hours/days of sale	Moderate	Low	A	Only feasible if enforced
Outlet density restrictions	Moderate	Low	A	Need to regulate the market first
Alcohol Taxation				
Increase Excise taxes on alcohol	High	Low	A	Government is moving in the right direction
Drinking/Driving countermeasures				
Sobriety check-points	Moderate	Moderate	A	Should consider increasing random breath testing
Lowered BAC limits	High	Low	A	Current efforts should focus on enforcing existing limits
Administrative License suspension	Moderate	Moderate	C	Useful, given the overburdened courts in South Africa
Graduated licensing for novice drivers	Moderate	Low	B	Implementation would be very feasible in South Africa
Brief Interventions				
Brief Interventions for Hazardous Drivers (including a structural motivational interviewing technique aimed at enhancing motivation to change)	Moderate	Low	B	Good option, but primary practitioners need training

A - general population
B - high-risk drinkers or groups considered to be vulnerable to the effect of alcohol
C - persons already manifesting harmful drinking and alcohol dependence

Source: Adapted from Schneider et al., 2007

The South African government should focus on enforcing existing legislation and regulating the market. Schneider et al. (2007) further encourage increases in excise tax, together with increases in sobriety check-points and administrative license suspensions. A further recommendation is graduated licensing for novice drivers.

7.1 EXCISE TAX

With regard to alcohol taxation, Schneider et al. (2007) note the relatively low real price of alcohol in South Africa, and recommend that the excise tax on all alcohol be increased as young drinkers are especially responsive to price. Table 12 also shows that this policy can be implemented at a relatively low cost. This section explores some theory behind excise taxes on alcohol and their application to the South African context.

Diamond (1973) considers the design of corrective taxation and notes that where there is separability between the externality and consumption, the optimal tax is the weighted average of the marginal contributions to the externality, across different individuals. The weights are given by the demand sensitivities for the good, in this case alcohol. As the external damage caused by alcohol consumption varies primarily across the number of units consumed (that is if the "last drink" causes all of the problems) and not across the type of individual who is consuming the alcohol, the externality tax is considerably higher (Crawford, 2008). Pogue and Sqontz (1989 in Crawford) look at varying external damage across individuals, namely non-abusive and abusive drinkers, when alcohol is taxed at the same rate. Their analysis aims to quantify the trade-off between the reduction in the welfare of non-abusive drinkers and the social benefits of reduced consumption by abusive drinkers. They do this by constructing different alcohol demand schedules for each abuser and non-abuser. The balance depends on the size of the marginal social cost, the size of the welfare loss of non-abusive consumption, the proportions of these two groups and their price elasticities.

If consumers have time-inconsistent preferences, that is, consumers frequently have intemporal preferences that change over time, the optimal tax should include not only external costs but also the internal costs that consumers impose on themselves (Gruber and Köszegi, 2001 in Crawford). However, the ideal tax policy for alcohol is less obvious as moderate drinking may yield medical benefits, implying that higher alcohol taxes could possibly have negative effects on health for moderate consumers.

Christiansen and Smith (2012) explore the use of excise taxes and government regulation, that is the regulation of availability.

Regulation acts as an increased cost to the consumer. Thus regulation has effects that are similar, but not equivalent, to an increase in price through tax. Their study looks at whether these two policy instruments are complements, substitutes or independent under different circumstances and how that affects the pareto-optimal excise tax. When externalities vary across units consumed but a uniform tax is used to avoid costly or unfeasible processes, they find that the outcome is improved by supplementing the tax with a direct regulation on consumption. For example, bars that close at a certain hour may limit public drunkenness at a lower cost than time-of-day or person-specific alcohol taxes, which are more complex and

are exposed to certain types of avoidance, including resale. In many circumstances the optimal externality tax is reduced with the introduction of another instrument to curb the externality as this increases the 'cost' of the alcohol. This instrument can take the form of regulation; for example, access and convenience 'costs' can be added to the financial cost of alcohol by regulating the market and imposing restrictions on the hours or days of sales. The extent of this depends on how marginal external costs and relative price-responsiveness of demand vary with consumption.

Strategies with proven effectiveness include regulating the availability of alcohol, imposing drinking-and-driving countermeasures and brief interventions for hazardous drinkers involving interview techniques to change motivation (Schneider et al., 2007). Other strategies recommended for the South African context by Parry (2005) include workplace interventions, broad-based community initiatives and specific interventions aimed at drunk pedestrians, drunk drivers and pregnant women.

8. CONCLUSION

This review of the negative externalities and costs associated with alcohol use in South Africa reveals the hazardous pattern of drinking among South Africans. With a pattern score of 3 and a position as one of the top five most risky drinking countries in the world recorded by the WHO, South Africa experiences costs and externalities above global averages, especially in the area of acute conditions. Acute conditions with the highest AAFs include interpersonal violence (61%) and transport fatalities (53%). The most noteworthy chronic conditions attributed to the misuse of alcohol are cirrhosis of the liver (73 761 DALYs), epilepsy (51 732 DALYs), and hypertensive disease (37 164 DALYs), with the highest DALYs being found in alcohol use or dependence (120 223 DALYs). The strong association between alcohol use and infectious diseases is also extremely important in the South African context because of the high prevalence of HIV/AIDS and tuberculosis. Although the negative health implications of alcohol misuse are severe, some benefits of moderate alcohol consumption can be seen for diabetes, strokes and IHD conditions.

The effect that alcohol misuse has on health and crime in South Africa affects direct government costs in many departments, as seen by the 2009/10 budget allocation analysis by Budlender (2010). Alcohol misuse cost the National and Provincial Departments of Health around R6.8 billion, followed by the cost borne by the Department of Safety and Security of R5.8 billion. Other economic and productivity costs are incurred through premature mortality and morbidity. Other non-financial costs to firms and co-workers include time away from work due to hangovers, traffic delays etc. and relational difficulties caused by inappropriate behaviour, disciplinary action and the like.

In order to account for the externalities incurred, certain policies are recommended for the South African context. These include increases in excise tax, increases in sobriety check-points, administrative license suspensions, graduated licensing for novice drivers, brief interventions for heavy drinkers, and tighter restrictions on alcohol advertisements. These policy interventions should be coupled with stronger enforcement of existing legislation and regulation of the market.

REFERENCES

Alda, E., Cuesta, J., 2011. A comprehensive estimation of costs of crime in South Africa and its implications for effective policy making. Journal of International Development 23, 926–935.

Anderson, P., 2010. Alcohol and the workplace A report on the impact of work place policies and programmes to reduce the harm done by alcohol to the economy. Focus on Alcohol Safe Environments (FASE), European Union.

Bacharach, S.B., Bamberger, P., Biron, M., 2010. Alcohol consumption and workplace absenteeism: The moderating effect of social support. J Appl Psychol 95, 334–348.

Budlender, D. 2010. ISS Africa | Money down the drain? The direct cost to government of alcohol abuse, [online] ISS Africa. Available: http://www.issafrica.org/publications/south-african-crime-quarterly/south-african-crime-quarterly-31/money-down-the-drain-the-direct-cost-to-government-of-alcohol-abuse-debbie-budlender
[Accessed 9 September 2013]

BDLive, 2013. *Western Cape says Liquor legislation must 'strike a balance.'* 19 July 2013. [online] Available: http://www.bdlive.co.za/national/law/2013/07/19/western-cape-says-liquor-legislation-must-strike-a-balance
[Accessed 8 August 2013]

Chaloupka, Frank J. & Warner, Kenneth E., 2000. "The economics of smoking," Handbook of Health Economics, in: A. J. Culyer & J. P. Newhouse (ed.), Handbook of Health Economics, edition 1, volume 1, chapter 29, pages 1539-1627 Elsevier.

Chermack, S.T., Giancola, P.R., 1997. The relation between alcohol and aggression: An integrated biopsychosocial conceptualization. Clinical Psychology Review 17, 621–649.

Cook, P.J., Moore, M.J., 2002. The Economics Of Alcohol Abuse And Alcohol-Control Policies. Health Aff 21, 120–133.

Crawford, I., Keen, M. and Smith, S., 2008. 'Value Added Taxes and Excises', Paper Prepared for the Report of a Commission on Reforming the Tax System for the 21st Century, Chaired by Sir James Mirrlees, Institute of Fiscal Studies, UK.

Croxford, J., Viljoen, D., 1999. Alcohol consumption by pregnant women in the Western Cape. S. Afr. Med. J. 89, 962–965.

Di Castelnuovo, A., Costanzo, S., Bagnardi, V., Donati, M.B., Iacoviello, L., de Gaetano, G., 2006. Alcohol dosing and total mortality in men and women: an updated meta-analysis of 34 prospective studies. Arch. Intern. Med. 166, 2437–2445.

Diamond, P., 1973. 'Consumption Externalities and Imperfect Corrective Pricing'.

Ezzati, M., Lopez, A.D., Rodgers, A., Vander Hoorn, S., Murray, C.J., 2002. Selected major risk factors and global and regional burden of disease. The Lancet 360, 1347–1360.

Eckardt, M.J., File, S.E., Gessa, G.L., Grant, K.A., Guerri, C., Hoffman, P.L., Kalant, H., Koob, G.F., Li, T.-K., Tabakoff, B., 1998. Effects of Moderate Alcohol Consumption on the Central Nervous System*. Alcoholism: Clinical and Experimental Research 22, 998–1040.

Ezzati, M., Lopez, A.D., Rodgers, A., Vander Hoorn, S., Murray, C.J., 2002. Selected major risk factors and global and regional burden of disease. The Lancet 360, 1347–1360.

Fisher, J.C., H.Bang, S.H. Kapiga, 2007. The association between HIV infection and alcohol use: A systematic review and meta-analysis of African studies. Sexually Transmitted Diseases, 34. 856-63.

Freebairn, J., 2010. Special Taxation of Alcoholic Beverages to Correct Market Failures*. Economic Papers: A journal of applied economics and policy 29, 200–214.

Graham, K., West, P., 2001. Alcohol and crime: Examining the link, in: Heather, N., Peters, T.J., Stockwell, T. (Eds.), International Handbook of Alcohol Dependence and Problems. John Wiley & Sons Ltd, New York, NY, US, pp. 439–470.

Greenfield, J.R., Samaras, K., Hayward, C.S., Chisholm, D.J., Campbell, L.V., 2005. Beneficial Postprandial Effect of a Small Amount of Alcohol on Diabetes and Cardiovascular Risk Factors: Modification by Insulin Resistance. JCEM 90, 661–672.

Harker, N., Kader, R., Myers, B., Fakier, N., Parry, C., Fisher, A., Peltzer, K., Ramlagan, S., Davids, A., 2008. Substance abuse trends in the Western Cape: a review of studies conducted since 2000.

Harker-Burnham, N., Dada, S., Linda, B., Meyers, B., Parry, C. 2013. The extent of problematic alcohol and other drug use within selected South African workplaces. SAMJ: 103(11):845-847.

Hendershot, C.S., Stoner, S.A., Pantalone, D.W., Simoni, J.M., 2009. Alcohol use and antiretroviral adherence: Review and meta-analysis. J Acquir Immune Defic Syndr 52, 180.

Institute for Health Metrics and Evaluation (IMHE). GDB Profile: South Africa. [online] Available: http://www.healthmetricsandevaluation.org/sites/default/files/country-profiles/GBD%20Country%20Report%20-%20South%20Africa.pdf
[Accessed 17 October 2013]

Krug, E. G., Dahlberg, L. L., Mercy, J. A., Zwi, A. B., & Wilson, A., 2002. The way forward: Recommendations for Action. In Krug, E. G., Dahlberg, L. L., Mercy, J. A., Zwi & R. Lozano (Eds.), world report on violence and health (pp. 241-254). Geneva: World Health Organisation.

Lim, S.S., Vos, T., Flaxman, A.D., Danaei, G., Shibuya, K., et al., 2012. A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. The Lancet 380, 2224–2260.

Lönnroth, K., Williams, B.G., Stadlin, S., Jaramillo, E., Dye, C., 2008. Alcohol use as a risk factor for tuberculosis – a systematic review. BMC Public Health 8, 289.

Mangione, T.W., Howland, J., Amick, B., Cote, J., Lee, M., Bell, N., Levine, S., 1999.
Employee Drinking Practices and Work Performance. Journal of Studies on Alcohol and Drugs 60, 261.

Matzopoulos, R., 2008. Alcohol and injuries - a clear link. Southern African Journal of Epidemiology and Infection 20, 114–115.

McCann M, Harker Burnhams N, Albertyn C, Bhoola U. 2011. Alcohol, Drugs and Employment. 2nd ed. Cape Town: Juta.

Moller, L., & Matic, S., 2010. Best Practice in estimating the cost of alcohol- recommendations for future studies. Copenhagen: WHO Regional Office for Europe.

Nelson, S., Kolls, J.K., 2002. Alcohol, host defence and society. Nat. Rev. Immunol. 2, 205–209.

Norman, R., Matzopoulos, R., Groenewald, P., Bradshaw, D., 2007. The high burden of injuries in South Africa. Bull World Health Organ 85, 695–702.

Obot, I., 2006. Alcohol use and related problems in sub-Saharan Africa. African Journal of Drugs and Alcohol Studies 5, 17–26.

Parry, C., 2005. A review of policy-relevant strategies and interventions to address the burden of alcohol on individuals and society in SA. S Afr Psychiatry Rev; 8: 20-24

Parry, C., J.Rehm, N.K. Morojele, 2010. Is there a causal relationship between alcohol and HIV? Implications for Policy, Practice and Future Research. African Journal of Drug and Alcohol Studies 9 (2).

Parry, C. dh, Myers, B., Thiede, M., 2003. The Case for an Increased Tax on Alcohol in South Africa. South African Journal of Economics 71, 137–145.

Parry, C., Dewing, S., 2006. A public health approach to addressing alcohol-related crime in South Africa. African Journal of Drugs and Alcohol Studies 5, 41–55.

Peterson, J.B., Rothfleisch, J., Zelazo, P.D., Pihl, R.O., 1990. Acute Alcohol Intoxication and Cognitive Functioning: Journal of Studies on Alcohol and Drugs 51, 114.

Pigou, A. C., 1920. The Economics of Welfare, London: Macmillan.

Pogue, T.F., Sgontz, L.G., 1989. Taxing to Control Social Costs: The Case of Alcohol. The American Economic Review 79, 235–243.

Rehm, J., Kehoe, T., rehm, M., Patra, J., 2009. Alcohol Consumption and Related Harm in WHO Africa region in 2004. Toronto, Canada: Centre for Addiction and Mental Health.

Rehm, J., Mathers, C., Popova, S., Thavorncharoensap, M., Teerawattananon, Y., Patra, J., 2009b. Global burden of disease and injury and economic cost attributable to alcohol use and alcohol-use disorders. The Lancet 373, 2223–2233.

Rehm, J., Samokhvalov, A.V., Neuman, M.G., Room, R., Parry, C., Lönnroth, K., Patra, J., Poznyak, V., Popova, S., 2009c. The association between alcohol use, alcohol use disorders and tuberculosis (TB). A systematic review. BMC Public Health 9, 450.

Rehm, J., Rehn, N., Room, R., Monteiro, M., Gmel, G., Jernigan, D., Frick, U., 2003. The global distribution of average volume of alcohol consumption and patterns of drinking. Eur Addict Res 9, 147–156.

Rehm, J., Room, R., Graham, K., Monteiro, M., Gmel, G., Sempos, C.T., 2003b. The relationship of average volume of alcohol consumption and patterns of drinking to burden of disease: an overview. Addiction 98, 1209–1228.

Rehm, J., Room., R., Monteiro, M. et al., 2004. Alcohol use. In Ezzati, M., Lopez, A., Rodgers, A., & Murray, C. J. L. (eds.) Comparative quantification of health risks: Global and Regional burden of disease attributable to selected major risk factors pp. 959-1108. Geneva: WHO.

Remington, P.L., Brownson, R.C., Wegner, M.V., 2010. Chronic disease epidemiology and control. xii + 659 pp.

Room, R., Babor, T., Rehm, J., 2005. Alcohol and public health. The Lancet 365, 519–530.

Sacco RL, Elkind M, Boden-Albala B, et al, 1999. The protective effect of moderate alcohol consumption on ischemic stroke. JAMA 281, 53–60.

Schneider, M., Norman, R., Parry, C., Bradshaw, D., Pluddemann, A., 2007.
Estimating the burden of alcohol abuse in South Africa in 2000.

Shield, K., Parry, C., Rehm, J., 2012. Chronic Diseases and Conditions Related to Alcohol Use. Article in press: Alcohol Research.

Shuper, P.A., M. Neuman, F. Kanteres, D.Baliunas, N. Joharchi, J. Rehm. 2010. Causal considerations on alcohol and HIV/Aids – a systematic review. Alcohol and Alcoholism, 45 , 159-166.

Single, E., Robson, L., Xie, X., Rehm, J., 1998. The economic costs of alcohol, tobacco and illicit drugs in Canada, 1992. Addiction 93, 991–1006.

UNAIDS, 2013. [online] Available: http://www.unaids.org/en/regionscountries/countries/southafrica/ *[Accessed 20 August 2013]*

UNAIDS and WHO, 2009. AIDS epidemic update: 2009. Geneva.

WHO, 2011. Global Status Report on Alcohol and Health. [online] Available: http://www.who.int/substance_abuse/publications/global_alcohol_report/msbgsruprofiles.pdf *[Accessed 13 August 2013]*

WHO, 2013. Mental Health: DALYs or YLDs definition. [online] Available: http://www.who.int/mental_health/management/depression/daly/en/ *[Accessed 13 August 2013]*

APPENDIX 1

TABLE A1: PATTERNS OF DRINKING INCLUDED IN COMPARATIVE RISK ASSESSMENT

PATTERN	LINK TO DISEASE BURDEN
Heavy drinking occasions 1: **High usual quantity of alcohol per occasion** **Heavy drinking occasions 2:** **Festive drinking common** **– at fiestas or community celebrations** **Heavy drinking occasions 3:** **Proportion of drinking occasions when drinkers get drunk**	Heavy drinking occasions lead to increase in injuries, even after adjustment for average volume of consumption. Also, heavy drinking occasions have been shown to lead to detrimental cardiovascular outcomes (CVD), again after adjustment for average volume. There are physiological explanations for the relationship of heavy drinking occasions both to injury and to CVD. Usual quantity per occasion, festive drinking and drinking to intoxication are different forms of heavy drinking. All have been used in the literature and linked to burden outcomes. **Ceteris paribus, the higher the frequency of heavy drinking occasions, the higher the alcohol-related disease burden.**
Heavy drinking occasions 4: **Proportion of drinkers who drink daily or nearly daily (reverse scored)**	The fewer occasions in which a given amount of alcohol is consumed, the more detrimental the consequences. Thus, given a fixed average volume of consumption, the higher the proportion of daily drinking, the lower the expected burden.
Drinking with meals – **how common it is to drink with meals (reverse scored)**	Drinking with meals has been shown in epidemiological and biological research to be less detrimental than drinking at other times. Thus, ceteris paribus, the higher the proportion of alcohol consumed with meals, the lower the alcohol related disease burden.
Drinking in public places – **how common it is to drink in public places**	Drinking in public often requires transportation, and thus has been linked to traffic accidents and injuries. Also, there may be psychological consequences like risky shift. Thus, the higher the proportion of alcohol consumed in public, the higher the alcohol-related disease burden. Again, this holds only when volume and other influencing factors are held constant.

Source: Rehm et al. 2003

APPENDIX 2: CLASSIFICATION OF WHO REGIONS

The Africa E region is a WHO Africa region classified by its very high child and adult mortality (Rehm et al., 2003). The WHO regions are accompanied by a letter from A to E indicating the level of child and adult mortality in that region. “A” indicates very low child and very low adult mortality, “B” indicates low child and low adult mortality, “C” indicates low child and high adult mortality, “D” indicates high child and high adult mortality, and “E” indicates very high child and very high adult mortality (Rehm, 2003).

A List of WHO Regions

AFRICA D Algeria, Angola, Benin, Burkina Faso, Cameroon, Cape Verde, Chad, Comoros, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Madagascar, Mali, Mauritania, Mauritius, Niger, Nigeria, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Togo.

AFRICA E Botswana, Burundi, Central African Republic, Congo, Côte d’Ivoire, Democratic Republic of the Congo, Eritrea, Ethiopia, Kenya, Lesotho, Malawi, Mozambique, Namibia, Rwanda, South Africa, Swaziland, Uganda, United Republic of Tanzania, Zambia, Zimbabwe.

AMERICAS A Canada, Cuba, United States of America.

AMERICAS B Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Brazil, Chile, Colombia, Costa Rica, Dominica, Dominican Republic, El Salvador, Grenada, Guyana, Honduras, Jamaica, Mexico, Panama, Paraguay, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, Uruguay, Venezuela.

AMERICAS D Bolivia, Ecuador, Guatemala, Haiti, Nicaragua, Peru.

EASTERN MEDITERRANEAN B Bahrain, Cyprus, Iran (Islamic Republic of), Jordan, Kuwait, Lebanon, Libyan Arab Jamahiriya, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, Tunisia, United Arab Emirates.

EASTERN MEDITERRANEAN D Afghanistan, Djibouti, Egypt, Iraq, Morocco, Pakistan, Somalia, Sudan, Yemen.

EUROPE A Andorra, Austria, Belgium, Croatia, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Luxembourg, Malta, Monaco, Netherlands, Norway, Portugal, San Marino, Slovenia, Spain, Sweden, Switzerland, United Kingdom.

EUROPE B Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Bulgaria, Georgia, Kyrgyzstan, Poland, Romania, Slovakia, The Former Yugoslav Republic of Macedonia, Tajikistan, Turkmenistan, Turkey, Uzbekistan, Yugoslavia.

EUROPE C Belarus, Estonia, Hungary, Kazakhstan, Latvia, Lithuania, Republic of Moldova, Russian Federation, Ukraine.

SOUTHEAST ASIA B Indonesia, Sri Lanka, Thailand.

SOUTHEAST ASIA D Bangladesh, Bhutan, Democratic People's Republic of Korea, India, Maldives, Myanmar, Nepal

WESTERN PACIFIC A Australia, Brunei Darussalam, Japan, New Zealand, Singapore.

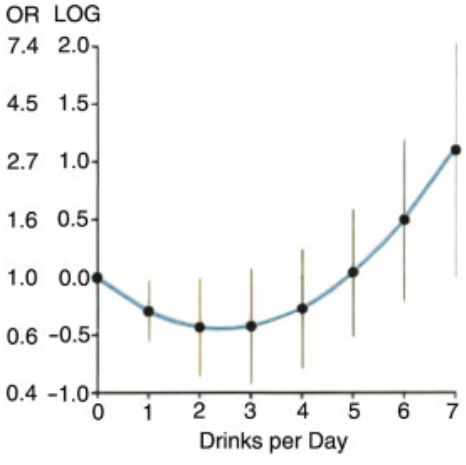
WESTERN PACIFIC B Cambodia, China, Cook Islands, Fiji, Kiribati, Lao People's Democratic Republic, Malaysia, Marshall Islands, Micronesia (Federated States of), Mongolia, Nauru, Niue, Palau, Papua New Guinea, Philippines, Republic of Korea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu, Vietnam.

Source: Rehm et al. 2003

APPENDIX 3: BENEFITS OF MODERATE ALCOHOL CONSUMPTION

FIGURE A3.1 ALCOHOL AND STROKE RISK

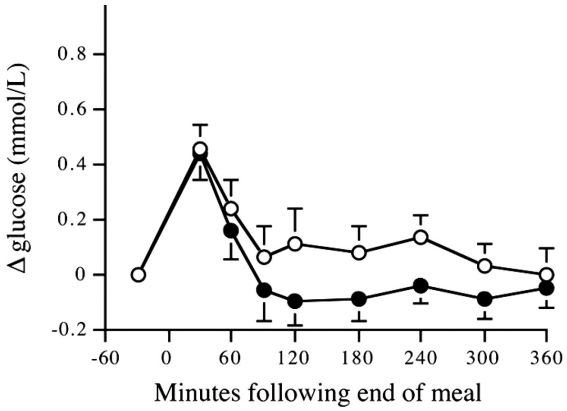
The relationship between daily alcohol and ischaemic stroke, adjusted for the usual stroke factors.



Source: Sacco et al.

FIGURE A3.2 WINE WITH MEALS REDUCES POSTPRANDIAL GLUCOSE

People with type 2 diabetes show substantially reduced postprandial glucose for up to 6h after the meal (solid circles), compared to those who drank the wine placebo (open circles).



Source: Greenfield et al. 2005

THE ECONOMICS OF ALCOHOL POLICY IN SOUTH AFRICA

CHAPTER 6

An International Analysis of Alcohol Affordability

EVAN BLECHER

AN INTERNATIONAL ANALYSIS OF ALCOHOL AFFORDABILITY

1. INTRODUCTION

Numerous studies over the past decades have shown that the demand for alcohol products is heavily influenced by changes in pricing (see Chapter 7). By raising the excise tax, policy makers are able to increase the retail price of alcohol products, thereby making the products less affordable.[1] Whereas increases in price temper demand, an increase in income tends to increase the demand.

The literature does not focus as much on the impact of income on the demand for alcohol products as it does on the impact on price. Even if it were known how much alcohol consumption changes in response to a change in consumers' incomes, it would have limited policy relevance, since few economists would argue against economic growth on the grounds that it would increase the demand for alcohol.

In recent decades, some countries, mainly in Asia, but more recently in Africa, have achieved unprecedented economic growth rates. In China, India, Indonesia, Vietnam and Bangladesh real per capita gross domestic product (GDP) has grown at annual rates of 6% or more. Rapid economic growth increases purchasing power. Alcohol demand generally increases with income. As their incomes increase, people find that many things, including alcohol, become more affordable.

This chapter focuses on the *affordability* of alcohol products. Affordability considers the simultaneous effect of income and price on a consumer's decision. Most studies to date considered price and income effects in isolation. The typical demand study includes both price and income as independent variables in a regression equation predicting consumption. However, one interprets the estimated coefficients in isolation, i.e. the effect of price on consumption holding income constant and vice versa. One can investigate the level of affordability (usually in a comparative context at a particular point in time), or changes in affordability over time. Both are analysed in this chapter. A number of definitions of affordability have been developed in the recent past, but essentially affordability refers to the quantity of resources required to buy a unit of alcohol (in terms of time, money or other products). More importantly, we also wish to compare South Africa to other countries, especially other low- and middle-income countries, with respect to the current level of affordability of alcohol products and trends in the affordability of alcohol products over time. While there is little academic work on the affordability of alcohol products there is a significant literature on the affordability of cigarettes. As such we will also use this literature as a benchmark for considering the trends in the affordability of alcohol products in South Africa.

2. LITERATURE REVIEW

The focus of the literature has been largely on cigarettes. A limited, and more recent, literature on the affordability in alcohol products has begun to emerge.

Scollo (1996) and Lal and Scollo (2002) compared the price of cigarettes to that of a Big Mac hamburger. They found that between 1995 and 2002 cigarettes had become relatively more expensive than Big Mac hamburgers in 15 of the 16 (high-income) countries included in their two surveys. While this is encouraging from a tobacco control perspective, the conclusion is limited to high-income countries. Another criticism is

[1] Although excise tax increases are the policy tool that governments use, this does not necessarily mean that prices rise as a result. Manufacturers determine prices and can elect to pass on the tax increase to consumers or to absorb it.

that these studies use the price of the Big Mac hamburger as the reference point. As such, they did not investigate affordability *per se*, but simply the price of cigarettes relative to an internationally standardised product (i.e. the Big Mac). This measure says as much about trends in the affordability of Big Mac hamburgers as it says about trends in the affordability of cigarettes.

Guindon *et al.* (2002) used an explicit measure of income by considering the time worked to purchase a pack of cigarettes. Based on the weighted average hourly earnings of twelve occupations monitored by the Union Bank of Switzerland's survey of earnings,[2] they calculated the average number of working minutes required to purchase a pack of local brand or Marlboro (or equivalent) cigarettes. They found that between 1990 and 2000 cigarettes became more affordable in 6 of the 25 (24%) high-income countries and in 4 of the 11 (36%) low- and middle-income countries in the sample. However, for the majority of both high-income and low- and middle-income countries, cigarettes became less affordable. From a tobacco control perspective, this is again an encouraging outcome.

Earlier studies focused primarily on high-income countries and used cross-sectional data at discrete points in time. Blecher and Van Walbeek (2004) considered a larger sample of 70 countries, of which 28 were high-income countries and 42 were low- and middle-income countries. They defined affordability in terms of per capita gross domestic product (GDP), which is a more encompassing definition of income than average earnings of a number of occupations. Despite being more expensive when expressed in a common currency, Blecher and Van Walbeek found that cigarettes were generally more affordable in high-income countries. Of the 28 high-income countries considered, cigarettes became more affordable in 11 (39%) and less affordable in 17 (61%) countries during the 1990s. Of the 42 low- and middle-income countries considered, cigarettes become more affordable in 24 (57%) and less affordable in 18 (43%) countries. For high-income countries these results corresponded with previous studies. However, the finding that cigarettes became more affordable in a majority of low- and middle-income countries is disappointing from a tobacco control perspective.

Kan (2007) investigated the affordability of cigarettes in 60 cities in 2006. Using a similar methodology to that used by Guindon *et al.* (2002), Kan calculated the percentage of daily income required to purchase a pack of cigarettes. Rather than using the average earnings of all fourteen occupations monitored by the Union Bank of Switzerland,[3] Kan considered the seven occupations with the lowest earnings, on the grounds that (1) the average wage is not distorted by the inclusion of highly paid occupations, and (2) it better reflects the income patterns of the poor (who, in many countries, are more prone to smoke, and typically spend a larger proportion of their income on cigarettes than the rich). Kan (2007: 429) found that cigarette affordability "remained high" in most cities surveyed, and concluded that there is scope for further tax increases. Kan also warned that cigarettes would become more affordable in the fast-growing emerging economies if cigarette prices do not keep pace with rate of economic growth.

Affordability is a relative, not an absolute, concept. One cannot, as Kan does, claim that cigarettes, or for that matter any consumer product, are affordable or not affordable. One can only say that the product is more or less affordable relative to another country or point in time. The choice of income measure is

[2] Gross wages are adjusted for differences in working time, holidays and vacations. The twelve occupations are primary school teachers, bus drivers, automobile mechanics, building labourers, skilled industrial workers, cooks, department managers, electrical or mechanical engineers, bank clerks, secretaries, saleswomen, and female industrial workers.

[3] Guindon *et al.* (2002) used all twelve occupations surveyed by the Union Bank of Switzerland at the time although the sample was subsequently increased to fourteen occupations.

potentially important since some measures of income are more representative than others. Particularly narrow measures of income, like the salary provided by a single occupation, are potentially misleading, since it may say more about the salary associated with that occupation than the affordability of the product.

A smaller literature investigating the affordability of alcohol products has begun to emerge. In one study, Kan and Lau (2013), investigate the affordability of scotch, cheap beer, table wine, gin, vermouth, cognac and liqueur, using the same method as Kan (2007) used for cigarettes, for 65 cities in 2009. Kan and Lau conclude that alcohol is highly affordable in many cities (88%) but the study lacks any time series analysis and uses the same absolute conclusions as Kan (2007).

2.1 METHODOLOGY

The literature is not without its problems; the goal here is to learn from these problems in order to refine the methodology used in this chapter, and specifically to adjust the methodologies to reflect the uniqueness of alcohol. Since affordability incorporates price and income components, the challenge is to obtain data that accurately reflect these two magnitudes.

2.2 DATA

Price data are drawn from the "Worldwide Cost of Living Survey" of the *Economist Intelligence Unit*. This survey is conducted every six months in order to assess the prices of goods and services in 140 of the world's major cities. Not all cities are included in the alcohol database. Prices used in this study were collected annually, covering each year for the period of 1990 to 2013. For most countries, a single city is monitored. In countries where multiple cities are monitored,[4] an unweighted average price is calculated. In 1990 the survey included 103 cities in 69 countries. By 2013 this number had risen to 140 cities in 92 countries. Over the period of investigation, the Economist Intelligence Unit expanded the coverage of their survey to include additional cities in countries that were already represented in the survey in 1990.[5] Such cities were excluded from the analysis because they bias the average price when the average cost of living differs significantly between the city (or cities) in the original survey and the newly included city[6] Finally, in some countries alcohol products are not legally sold or not easily available because of religious objections.

[4] Namely Australia (5), Brazil (2), Canada (4), China (8), France (2), Germany (5), India (2), Italy (2), Japan (2), New Zealand (2), Russia (2), Saudi Arabia (3), South Africa (2), Spain (2), Switzerland (2), the United Arab Emirates (2), the United Kingdom (2), the United States (16) and Vietnam (2). The number of cities is shown in parenthesis.

[5] Namely China, Russia, South Africa, the United Arab Emirates, the United Kingdom, the United States and Vietnam.

[6] The example of China is useful here. In 1990 only Beijing was included in the survey. In 1993 two further cities, Guangzhou and Shanghai were added, in 1999 Shenzhen and Tianjin were added to the survey, and in 2000 Dalian and Qingdao were added. Finally, Suzhou was added in 2005. The average price of alcohol products would be artificially lowered in 1993, because the cost of living (and the price of alcohol) was substantially lower in Guangzhou and Shanghai than in Beijing, which was the only Chinese city included in the earlier survey. It is quite conceivable that, in 1993, the average price of an alcohol product including Guangzhou and Shanghai increased despite the decrease in price in the whole sample. This would clearly be a misrepresentation of the true underlying price trend. The same is possible for the inclusion of other cities later.
Having said this, including or excluding cities that were included in the survey after 1990 from the analysis does not have much quantitative impact on the price and affordability indicators. For most countries the issue is irrelevant, because no new cities were included in the sample after 1990. Even for countries for which it would matter, the correlation coefficient between the prices based on the average of the original and the expanded pool of cities is in excess of 0.95.

In these countries, prices are not collected and are thus excluded from the analysis (the countries are Brunei, Iran, Kuwait, Libya and Saudi Arabia).

The survey considers alcohol products in three categories: beer, wine and spirits. Two beer products are considers, a local beer brand (in units of 1 litre) and a premium or top quality brand of beer (in units of 330ml). The top quality beer is more expensive than he local beer in standardized size. Three wine products are considered: a common table wine, a superior quality wine and fine quality wine (all in units of 750ml). Generally, the prices of fine quality wine are higher than superior quality wine prices and superior quality wine prices are higher than common table wine, although there are a number of exceptions. Five categories of spirits are included, namely Gin, represented by Gilbey's Gin (or nearest equivalent), Whisky (six year old), Vermouth, represented by Martini & Rossi (or nearest equivalent), Cognac (French VSOP) and Liqueur (represented by Cointreau). All spirits are measured in units of 700ml with the exception of Vermouth, which is measured in units of one litre.

The survey considers the prices of all brands sold at two types of outlet: high volume supermarket, and mid-price retail outlet. Since the emphasis is on affordability, the lowest of the two retail environments was selected for each year. In addition, we consider only the cheapest product in each category in each country in each year. Both these conventions are consistent with the cigarette affordability literature.

The Economist Intelligence Unit collects price data in local currency. To compare alcohol prices between countries, all prices were converted to United States dollars using two exchange rates: (1) market exchange rates on the day of the survey from the Economist Intelligence Unit,[7] and (2) purchasing power parity (PPP) conversion factors from the World Bank's "World Development Indicators" online database.

Calculating affordability measures does not require that the price data be converted to a common currency, because income data are also collected in local currency.

While price is conceptually quite easy to comprehend, income is more complex. Firstly, how does one define income? Should one use a broad definition (e.g. per capita GDP) or a narrow definition (e.g. after-tax income)? While a broad definition of income is less sensitive to differences in tax regimes and government's role in providing goods, services and grants, a narrow definition is typically better understood by the public. For example: "A London teacher's net hourly earnings in 2006 was £8.65" is typically better understood than "Per capita GDP in the United Kingdom in 2006 was £21 084". Secondly, there is the issue of income distribution. Two countries may have a similar average level of income, but if the income distributions are dissimilar, affordability measures in such countries would not be comparable. Given the same price, alcohol is likely to be more affordable in a middle-income country with a relatively equal income distribution than in a country with a similar average level of income, but where a large proportion of the population may be desperately poor.

We use two income measures. Per capita GDP is a broad measure of income and has the advantage of being calculated using a consistent methodology. It is generally regarded as a good indicator of average living standards, despite the fact that it does not take differences in the distribution of income into account. GDP data were drawn from the World Bank's "World Development Indicators" online database. Local currency aggregate GDP was converted into per capita terms using population statistics from the same database. All countries who are members of the World Bank are reported in the database.[8]

[7] The data are provided by the *Economist Intelligence Unit* in both local currencies and United States dollars. They indicate that the conversion is made using the market exchange rate on the day of the survey.

[8] Taiwan is a notable exclusion since it is not considered an independent country by the World Bank.

The second income measure is the Union Bank of Switzerland survey of earnings, also used by Guindon *et al.* (2002), Kan (2007) and Blecher and Van Walbeek (2009). The survey calculates gross and net hourly earnings in a number of occupations in the most important commercial cities around the world every three years.[9] We used six surveys (1997, 2000, 2003, 2006, 2009 and 2012) to construct a discrete time series of median earnings. The surveys were based on twelve occupations in 1997 and 2000, thirteen in 2003, fourteen in 2006 and 2009 and fifteen in 2012.[10]

2.3 METHODS

The *relative income price* is a broad measure of affordability developed by Blecher and Van Walbeek (2004) for measuring the affordability of cigarettes. This measure has received significant attention in the tobacco control literature and has featured in country level studies (Guindon *et al.*, 2010) and global publications like the *Tobacco Atlas* (Mackay *et al*., 2006; Eriksen *et al.*, 2012). The relative income price calculates the percentage of per capita GDP required to purchase the 100 cheapest packs of cigarettes. The higher the relative income price, the less affordable cigarettes are, and vice versa. The measure is adjusted for various quantities of alcohol products.

The relative income price was calculated for each year in the period 1990 to 2012, for as many countries as the data allowed. During the period under investigation some countries experienced hyperinflation, which complicated the data analysis. In some cases manual adjustments were required to make the GDP data and the price data comparable.

The *minutes of labour* method was developed to measure the affordability of cigarettes by the World Health Organisation (World Health Organisation, 1998) but popularised by Guindon *et al.* (2002). It has also gained a significant amount of attention in the tobacco control literature, in publications such as the *Tobacco Atlas* (Mackey *et al.*, 2006b). It is defined as the minutes of labour required to purchase the cheapest pack of cigarettes (as surveyed by the *Economist Intelligence Unit*), based on net earnings. There are a number of variations of this methodology. Guindon *et al.* (2002) use the weighted average of all occupations as calculated by the Union Bank of Switzerland. Alternatively one may choose to use the simple average or the median. In this chapter we use the median for calculating the minutes of labour method because it is not affected by outliers of earnings in specific occupations.

The typical way to determine whether alcohol products have become more or less affordable in the years since 1990 would be to compare the most recent value to a past value. Using only the starting and ending values the average annual growth rate is computed using the standard formula: $(Y_t/Y_{t-n})^{1/n} - 1$. If no information on prices is available for the period between the starting and ending years, this is the appropriate procedure. However, if the intermediate values are known and either the starting or ending values are outliers, i.e. significantly different from the underlying trend, the calculated growth rate will be unrepresentative of the true trend. To prevent such distortions, a constant growth regression line was fitted to all observations (see Gujarati, 2003: 178-181). This entails fitting the regression line $ln(Y_t) = \alpha + \beta t +$

[9] This included 55 cities in 48 countries in 1997, 58 cities in 50 countries in 2000, 70 cities in 59 countries in 2003, 70 cities in 58 countries in 2006, 73 cities in 60 countries and 2009, and 72 cities in 59 countries in 2012.

[10] The occupations were primary school teachers, bus drivers, automobile mechanics, building labourers, skilled industrial workers, cooks, department managers, engineers, bank credit clerks, secretaries, saleswomen, and female industrial workers. The additional occupation in 2003 was a product manager and the additional occupation in 2006 was a call centre agent. The additional occupation in 2012 was a financial analyst.

ε_t where $t = 0, 1, 2, \ldots$. The estimated value of β is the estimated constant growth rate of the variable Y. An advantage of this approach is that even if some values are missing (even at the extremities), one can still estimate the value of β.

Although all reasonable measures have been taken to ensure that the data are correct, a variety of factors--including changes in currencies, hyperinflation, temporary spikes in prices, errors in collection, volatile exchange rates, etc.--could result in incorrect and possibly outlier values. Of the two measures of central tendency (mean and median), we typically used the median, because it is not susceptible to the influence of outliers, whereas the mean is.

The sample consists of 87 countries where GDP was used as the measure of income and 55 countries where the Union Bank of Switzerland data were used. The World Bank's classification in July 2012 (World Bank, 2012) was used to divide the countries into two income categories: high-income countries (40 for GDP and 35 for UBS) and low- and middle-income countries (47 for GDP and 20 for UBS).

In this study we measure the affordability of only four alcohol products, namely beer, wine, and two spirit products, gin and whisky. These four products are the most popular and recognizable of the products collected in the price series used. The other spirits products are excluded to reduce the complexity of the study. Furthermore, brandy, while popular in South Africa, is not as common a global product and would make global comparison more difficult, while vermouth and liqueur are not common drinking products in many countries.

Since the key focus of this study is to place South Africa in an international context with respect to alcohol prices and affordability, South Africa is highlighted in each figure in green to allow for easier comparison.

One weakness of the measures of affordability introduced in this chapter is their poor ability to account for inequalities in income. The measures use average income or median wages to measure affordability.

The concern about inequalities in income has shaped our definitions of affordability. We use per capita gross domestic product as the measure of income since gross domestic product includes transfer payments like social grants that are not accounted for in measures of wages. We also use median wages rather than average wages since the median is less distorted by outliers than the average. However, neither measure is adequate when accounting for income inequality.

The cigarette affordability literature (Blecher and Van Walbeek, 2009) has attempted to deal with issues about affordability by using the median of the lower half of wages (25^{th} percentile as opposed to the 50^{th} percentile) measured by the UBS data in addition to the median of all occupations, however, the ranked correlation between the two measures is high. This is mostly because the UBS survey measures wages of skilled occupations and does not reflect the wages earned by the poor, often in the informal sector, or reflect large sectors of the population who may be unemployed.

In no country in the world is income evenly distributed among the population. Some countries have very unequal distributions in income, where the rich hold higher segments of income than in other countries. South Africa has a very unequal income distribution. This means that concerns about the inability of affordability measures to take into account inequalities in income is probably more important in South Africa than in most countries.

While income inequality is a problem, and its effect on affordability is important, we are able to understand what the likely impact is. In countries with high income inequality the current methods show alcohol products to be significantly more affordable to the poor than they actually are. For instance, in a country like South Africa, with high levels of income inequality and high levels of unemployment, alcohol products are less affordable for the poor than for the average or median person. Furthermore, worsening income inequality in recent decades means that while alcohol products have become rapidly more affordable on average, this increase in affordability would have been less dramatic among the poor. Further research is needed in order to understand properly differences in affordability within countries and the effect of income inequality on the measurement of affordability.

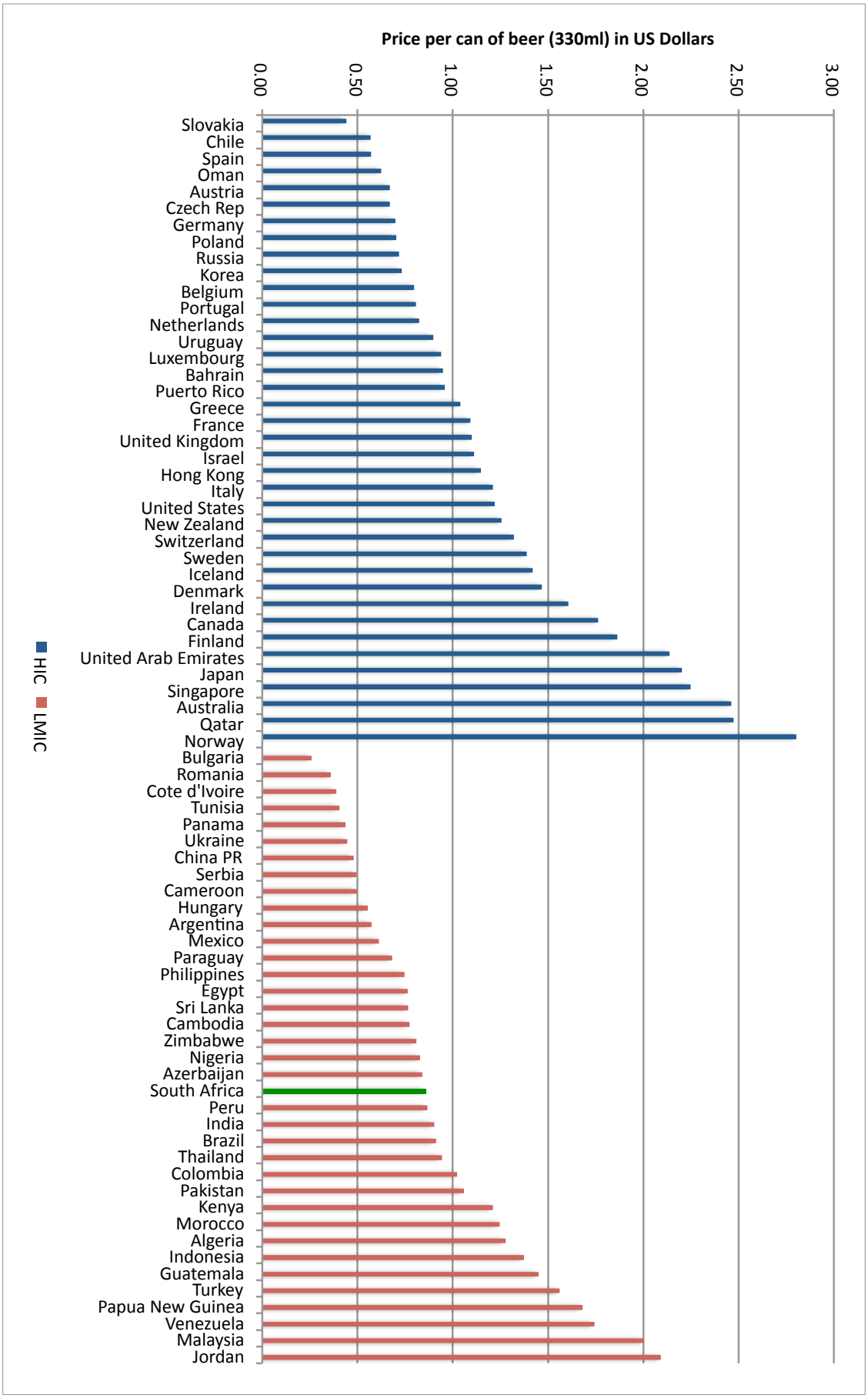
2.4 RESULTS

2.4.1 DIFFERENCES IN ALCOHOL PRICES IN 2012

Conventional wisdom tells us that prices of most products, expressed in a common currency, are much higher in high-income countries than in low- and middle-income countries. Since alcohol price and tax data are often easily accessible, these are typically the focus of cross-sectional studies. However, as will be shown below, while an understanding of price differences is useful in some situations, alcohol prices by themselves are not necessarily a good indicator of affordability. Nevertheless, we consider alcohol prices in some detail here, since they form the standard against which we compare the affordability measures.

We consider the prices of four alcohol products, namely beer, wine, gin and whisky. For each price we consider the lowest price in each country in each year. Two price indicators are shown: firstly, the nominal price of each product in US Dollars for the most recent year, 2012, and then the price of each product in PPP-adjusted international dollars (purchasing power parity). The use of PPP-adjusted international dollars adjusts for differences in purchasing power across country. Figures 1 through 4 show the prices in nominal US Dollars for beer, wine, gin and whisky, respectively, while Figures 5 through 8 show the prices in PPP-adjusted international dollars for the four products. The data are presented for each product, with countries ranked according to their development status (high-income countries and low- and middle-income countries) and then according to the price from cheapest to most expensive. Tables 1 and 2 summarize the measures of central tendency and variation for all four products for high-income and low- and middle-income countries, respectively.

FIGURE 1: NOMINAL PRICES OF BEER IN USD IN 2012



Note: Bangladesh removed since it is an outlier that distorts the figure.

FIGURE 2: NOMINAL PRICES OF WINE IN USD IN 2012

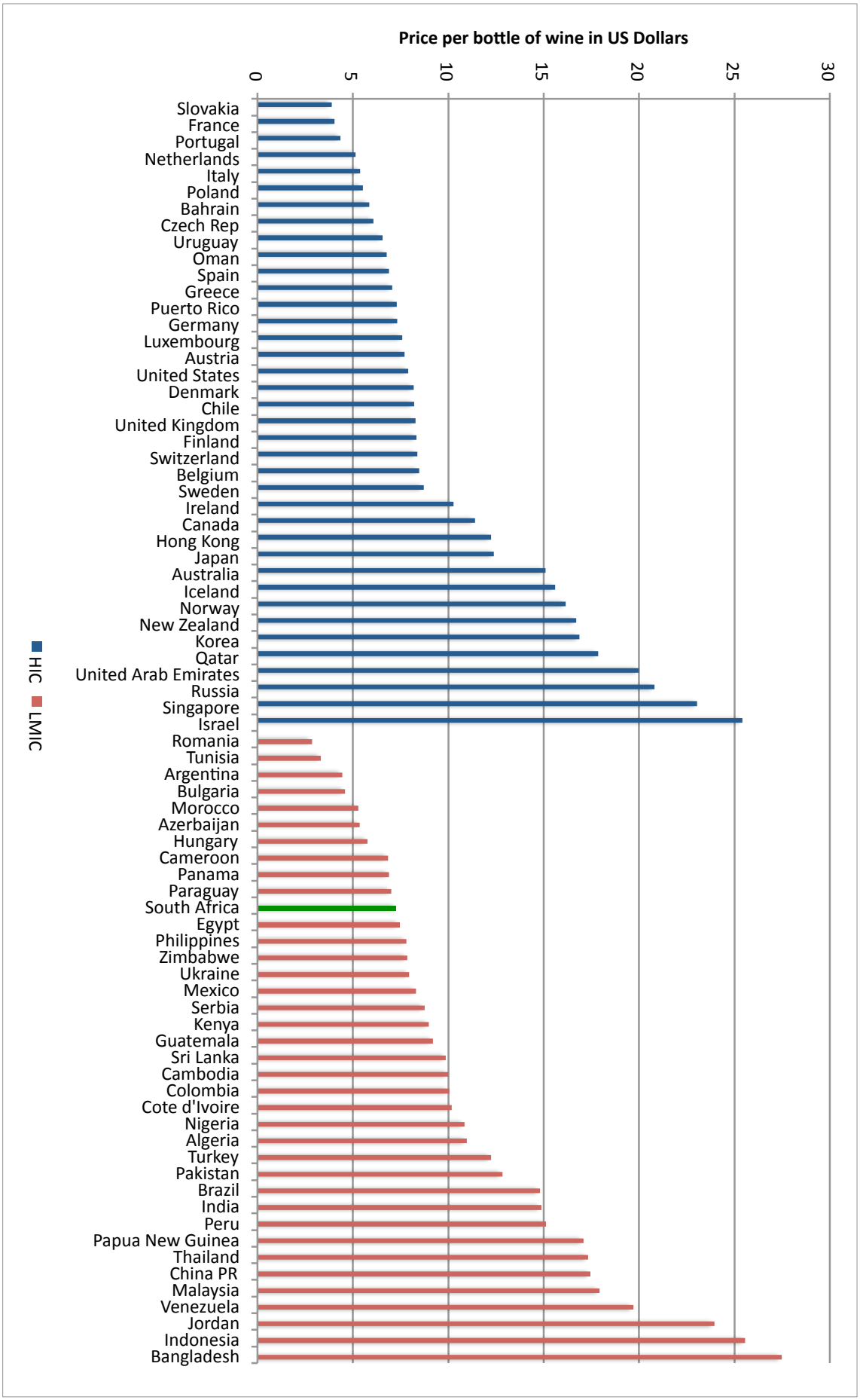
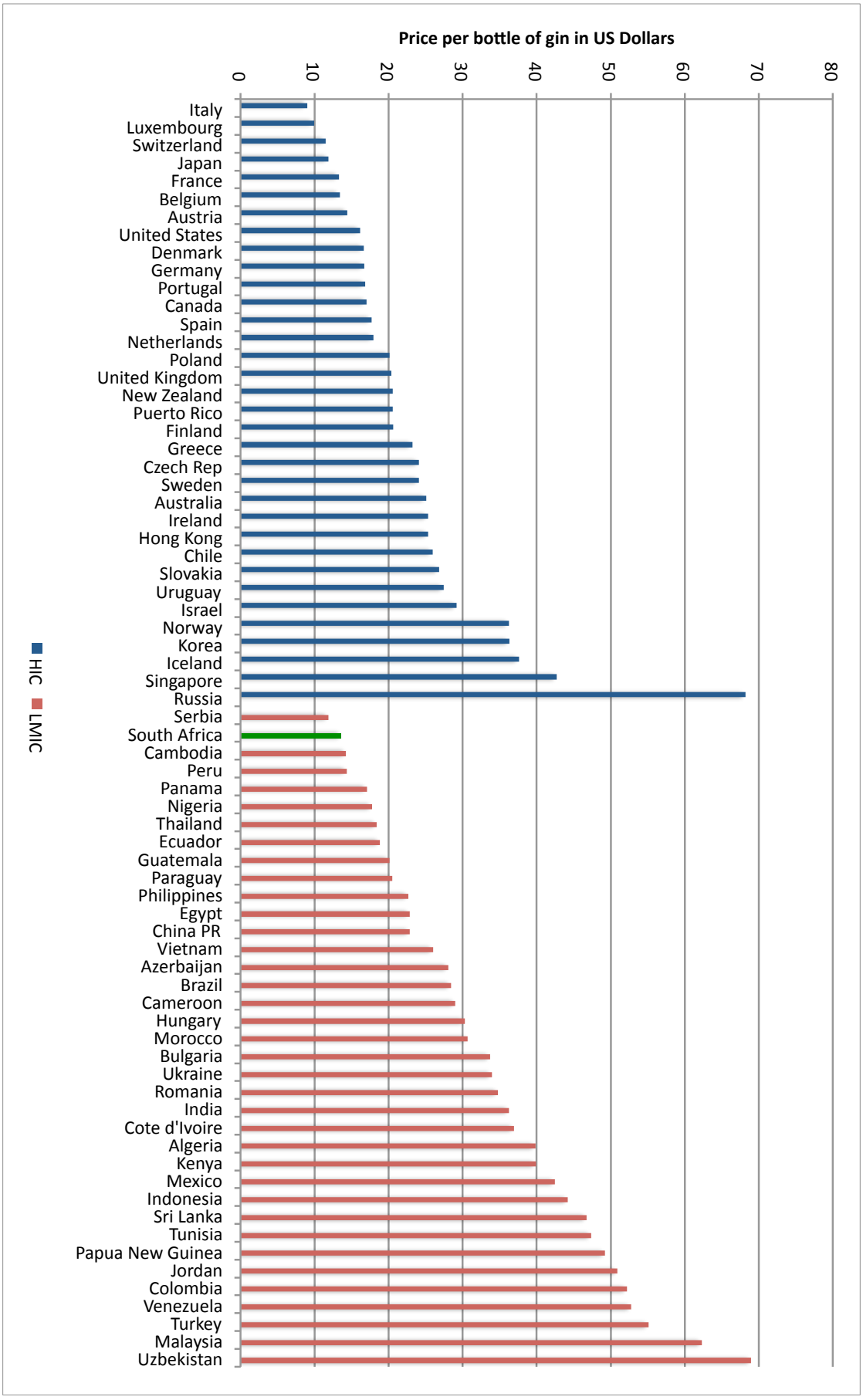


FIGURE 3: NOMINAL PRICES OF GIN IN USD IN 2012



Note: Pakistan removed since it is an outlier that distorts the figure.

FIGURE 4: NOMINAL PRICES OF WHISKY IN USD IN 2012

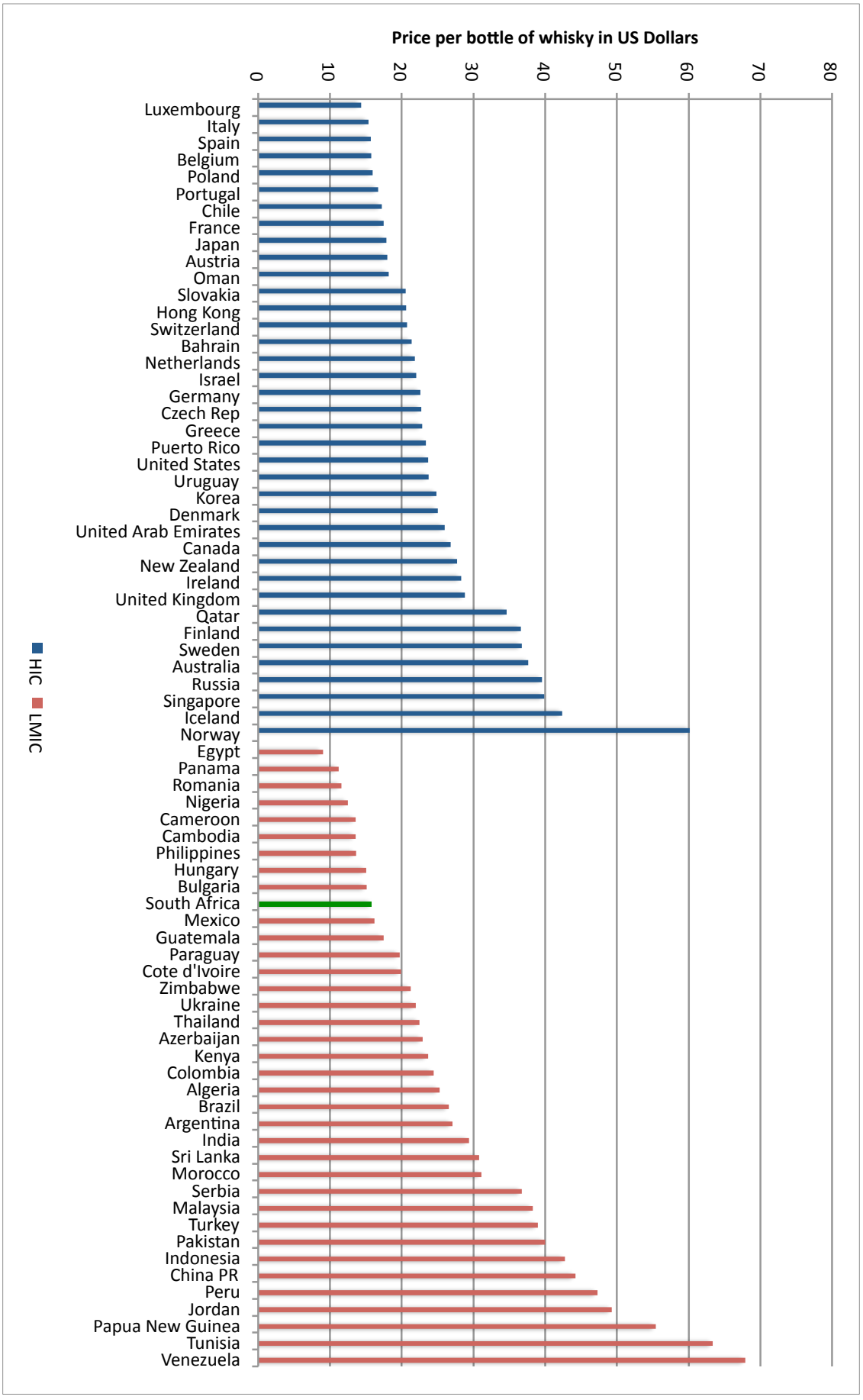


TABLE 1: SUMMARY STATISTICS FOR ALCOHOL PRICES IN USD IN 2012 (USING MARKET EXCHANGE RATES)

	MEDIAN	MEAN	STANDARD DEVIATION	CV
High-income countries				
Beer	$1.23	$1.10	$0.63	0.50
Wine	$8.24	$10.47	$5.62	0.54
Gin	$19.14	$22.04	$9.91	0.50
Whisky	$22.81	$25.37	$9.63	0.38
Low- and middle-income countries				
Beer	$0.95	$0.83	$0.60	0.63
Wine	$9.09	$10.90	$6.36	0.58
Gin	$17.28	$20.72	$11.56	0.56
Whisky	$23.66	$27.99	$15.08	0.54
LMIC as multiple of HIC				
Beer	0.8	0.8		
Wine	1.1	1.0		
Gin	0.9	0.9		
Whisky	1.0	1.1		

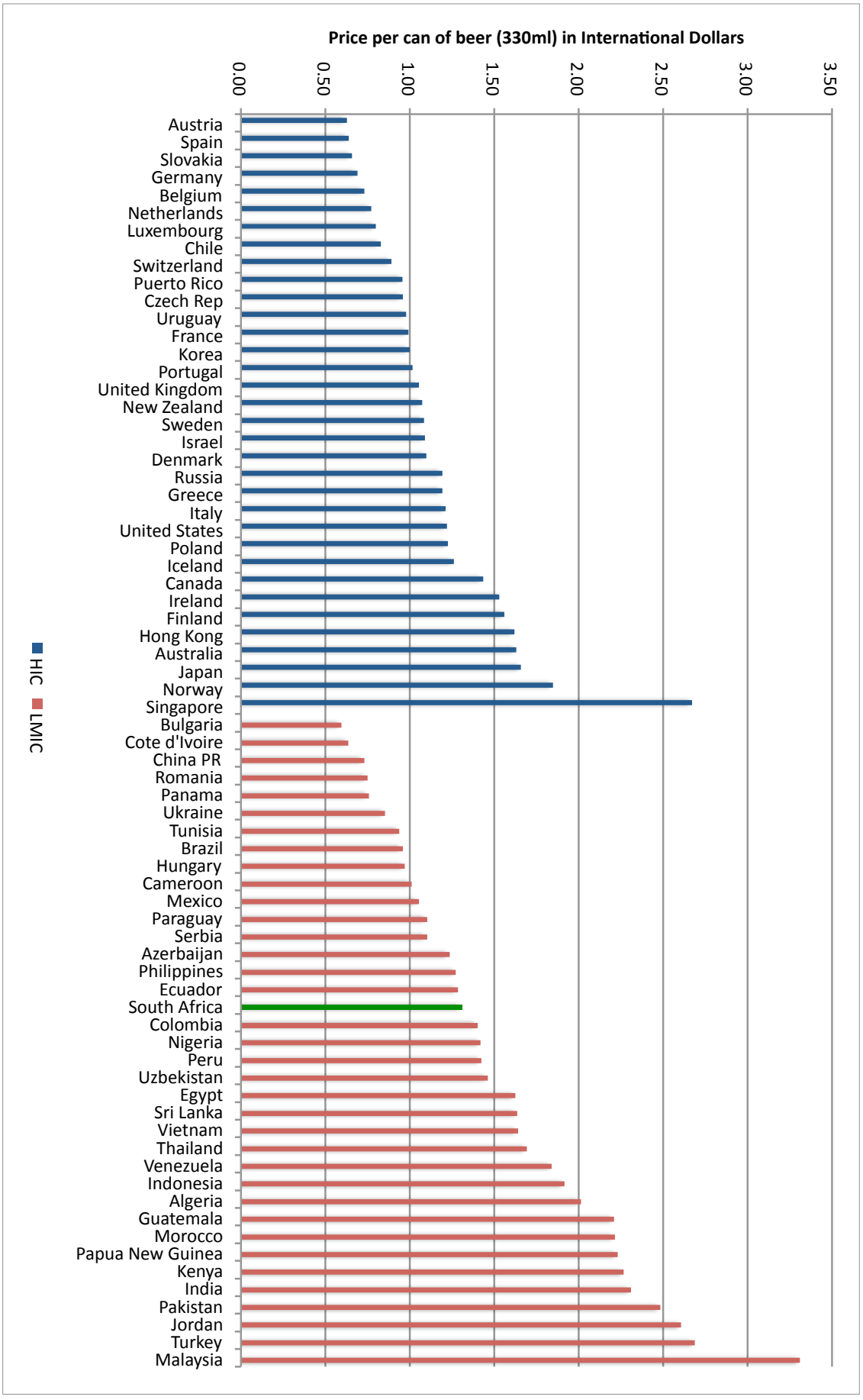
Beer is, on average and at the median, more expensive in richer countries than in poorer countries, however, this pattern is not consistent across all other alcohol products. Wine and whisky are cheaper in high-income countries than in low- and middle-income countries, but not significantly so. However, gin is more expensive in high-income countries than in low and middle-income countries. It is clear that the conventional wisdom that many goods and services are more expensive, in absolute terms, in high-income countries versus low- and middle-income countries, does not hold for alcohol products and even when it does (for beer and gin) the differences are not always statistically significant. This is most likely because alcohol products are not conventional products. Firstly, their prices are influenced by excise taxes in a manner in which many other goods and services are not, but secondly, many of them are luxury products by nature, especially wine, gin and whisky.

A second feature of the figures and the table is the very large variability in the US dollar prices among countries with a similar level of development. This variation is found for all four products and can be quantified by the standard deviation. However, given the different orders of magnitude of the standard deviation across the four alcohol products, the coefficient of variation (which is the ratio of the standard deviation to the mean) allows for comparison across product and also between groups of economic development. The coefficient of variation ranges from 0.38 (whisky) to 0.54 (wine) for high-income countries. The coefficient of variation is higher for each of the four products in low- and middle-income countries, ranging from 0.57 (whisky) to 0.63 (beer). While these figures are certainly useful in some circumstances, one cannot infer anything about the affordability of alcohol products from them, because they do not incorporate the level of income. To know that a beer is very expensive in Norway is useful information for a drinker travelling to that country. Similarly, multinational alcohol companies would be interested to know the net-of-tax prices, expressed in a common currency. (The prices shown in the above figures are the tax-inclusive prices.)

Rather than using market exchange rates to convert local currency prices to internationally standardised prices one could use purchasing power parity (PPP) conversion factors.[11] This approach takes account of the fact that the costs of living vary between countries, but it still does not consider the impact of differences in the level of income between countries. As such, it is still a price measure rather than an affordability measure. Figures 5 through 8 show the prices in PPP-adjusted international dollars for the four products, and Table 2 shows the summary statistics.

[11] Whereas market exchange rates are readily available on a daily basis, PPP conversion factors are calculated annually as the ratio of the price levels between countries. The PPP conversion factors are derived from a comprehensive basket of goods and services, including non-tradables.

FIGURE 5: PRICES OF BEER IN PPP-ADJUSTED INTERNATIONAL DOLLARS IN 2012



Note: Bangladesh removed since it is an outlier that distorts the figure.

FIGURE 6: *PRICES OF WINE IN PPP ADJUSTED INTERNATIONAL DOLLARS IN 2012*

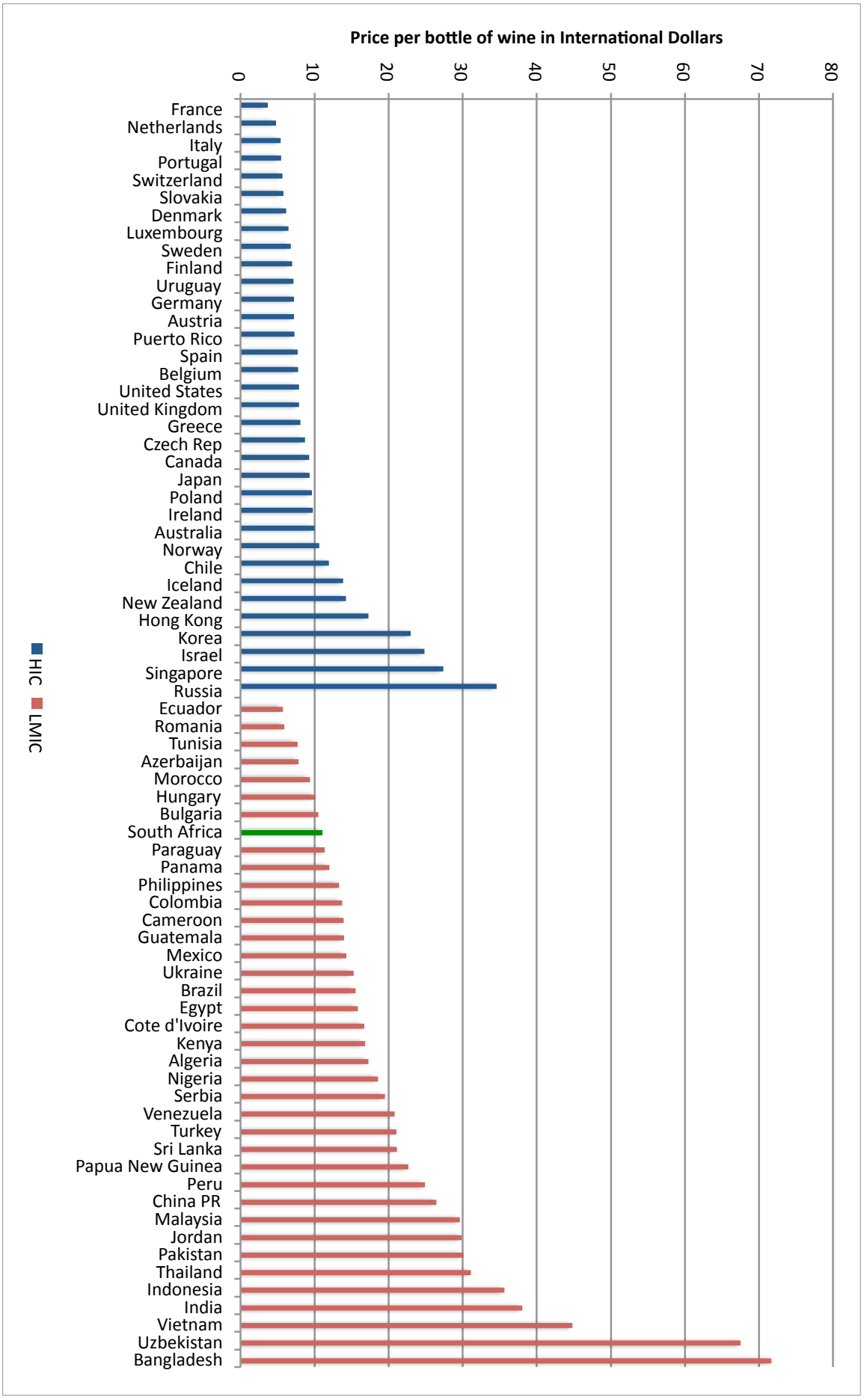
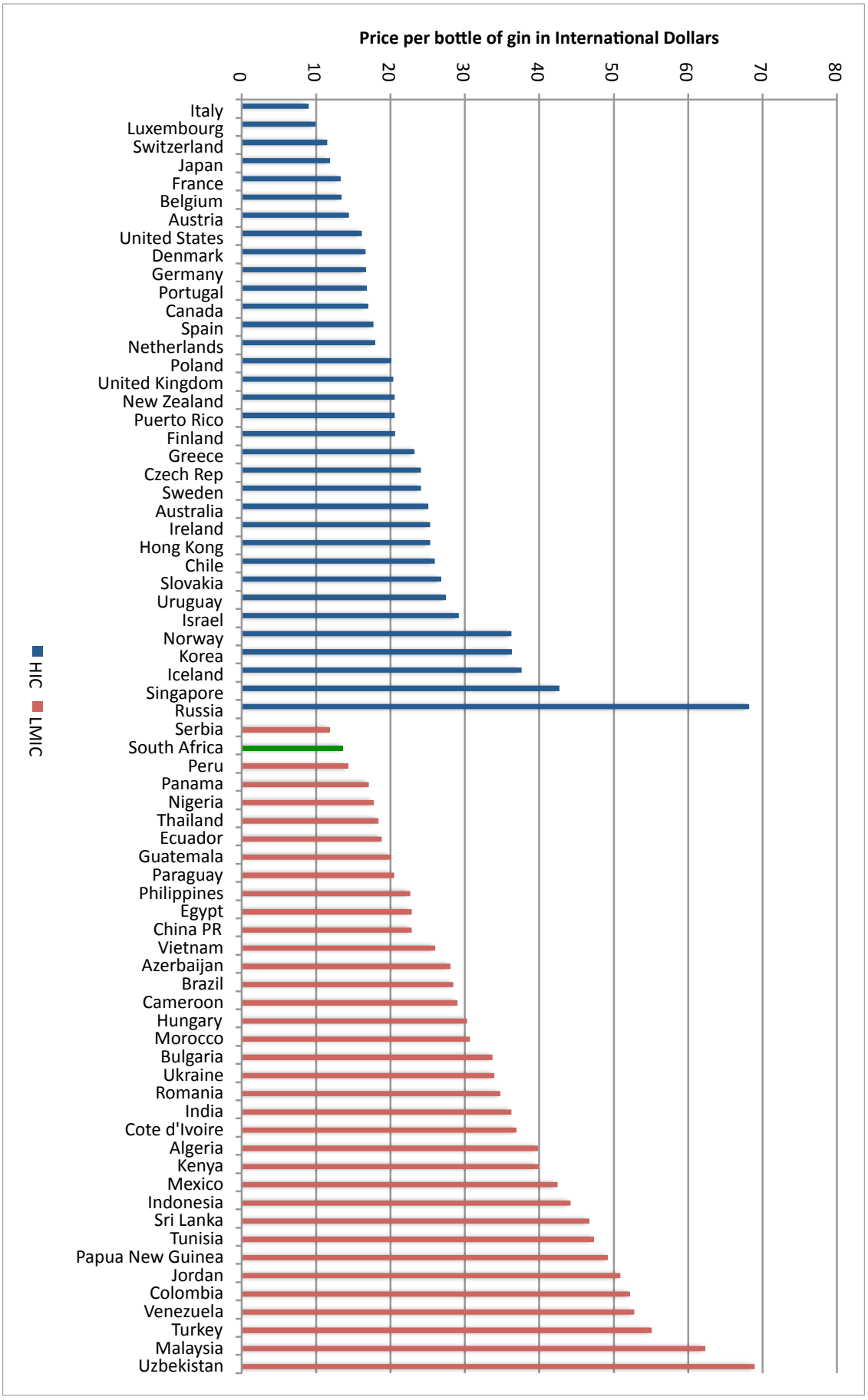


FIGURE 7: PRICES OF GIN IN PPP ADJUSTED INTERNATIONAL DOLLARS IN 2012



Note: Pakistan removed since it is an outlier that distorts the figure.

FIGURE 8: *PRICES OF WHISKY IN PPP ADJUSTED INTERNATIONAL DOLLARS IN 2012*

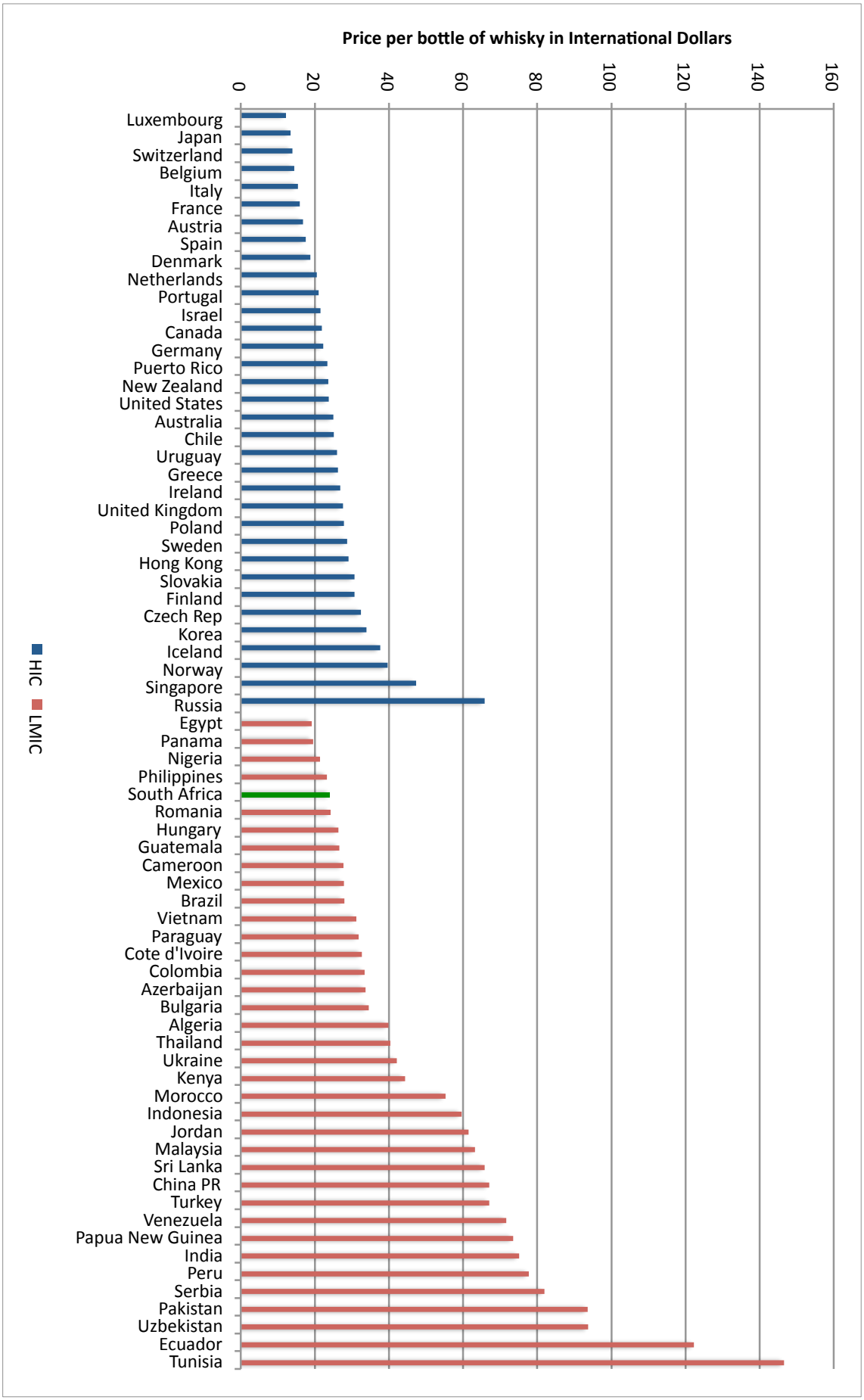


TABLE 2: SUMMARY STATISTICS FOR ALCOHOL PRICES IN PPP ADJUSTED INTERNATIONAL DOLLARS IN 2012

	MEDIAN	MEAN	STANDARD DEVIATION	CV
High-income countries				
Beer	$1.08	$1.15	$0.42	0.36
Wine	$7.91	$10.59	$7.01	0.66
Gin	$20.55	$23.01	$11.36	0.49
Whisky	$24.33	$25.79	$10.59	0.41
Low- and middle-income countries				
Beer	$1.42	$1.66	$1.24	0.75
Wine	$16.70	$20.81	$14.94	0.72
Gin	$33.74	$36.05	$19.42	0.54
Whisky	$40.32	$51.55	$29.98	0.58
LMIC as multiple of HIC				
Beer	1.3	1.4		
Wine	2.1	2.0		
Gin	1.6	1.6		
Whisky	1.7	2.0		

When adjusting for PPP all alcohol products are significantly more expensive in low- and middle-income countries than in high-income countries, at both the mean and median. Again, there is significant variance in alcohol prices for all products in both high-income and low- and middle-income countries, but the pattern of variation is not as consistent as with nominal prices. There is more variation for all products (except gin) in low- and middle-income countries than was seen with nominal prices, and this is particularly significant for beer and wine. While there is significantly less variation in prices for beer in high-income countries than with nominal prices, the opposite is true for PPP-adjusted wine prices, where significantly more variation is seen than with nominal prices. There is no significant difference in gin and whisky price variation between PPP-adjusted and nominal prices in high-income counties.

It is clear that when taking differences in purchasing power into account, alcohol products are generally more expensive in low- and middle-income countries.

2.4.2 DIFFERENCE IN AFFORDABILITY IN 2012

Affordability is measured using two measures, the relative income price (the percentage of per capita GDP required to purchase a given volume of alcohol product) and the minutes of labour required to purchase a given volume of alcohol product. The lower the relative income price, the more affordable alcohol is, and the higher the relative income price, the less affordable it is. The lower the minutes of labour, the less one is required to work to purchase alcohol products, and hence the more affordable they are. The relative income price for all four products in the most recent years are shown in Figures 9 through 16. For each product two figures are shown, the first with only one vertical axis, and the second with two vertical axes, one for high-income countries and another for low- and middle-income countries. This is done because the range of relative income prices for low- and middle-income countries for all products is significantly higher than for high-income countries. The single axis distorts the range in variation of relative income prices, especially those of high-income countries. However, the single axis figures are included to allow the reader to appreciate fully the range of relative income prices. The minutes of labour for each product are shown in Figures 17 through 20. Figures 17-20 approximate Guindon et al.'s (2002) method and aims to estimate the affordability of alcohol products for the median employed person. The countries are again sorted, first by development status, and then by the affordability measures from lowest (most affordable) to highest (least affordable). Furthermore, Tables 3 and 4 summarize the measures of central tendency and variation for the two affordability measures for high-income and low- and middle-income countries.

FIGURE 9: RELATIVE INCOME PRICE (RIP) OF BEER IN 2012 (SINGLE AXIS)

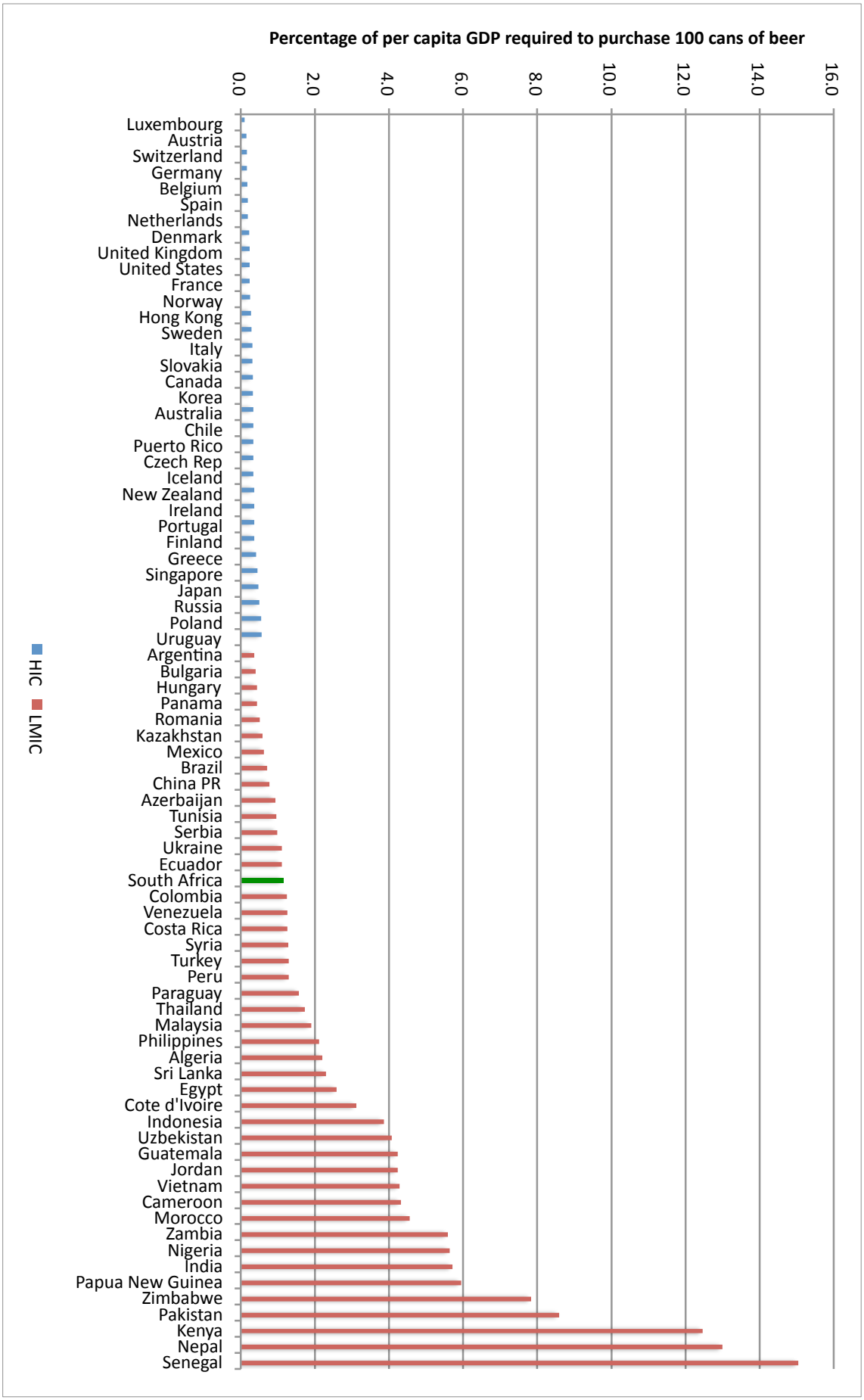


FIGURE 10: RELATIVE INCOME PRICE (RIP) OF BEER IN 2012 (DUAL AXIS)

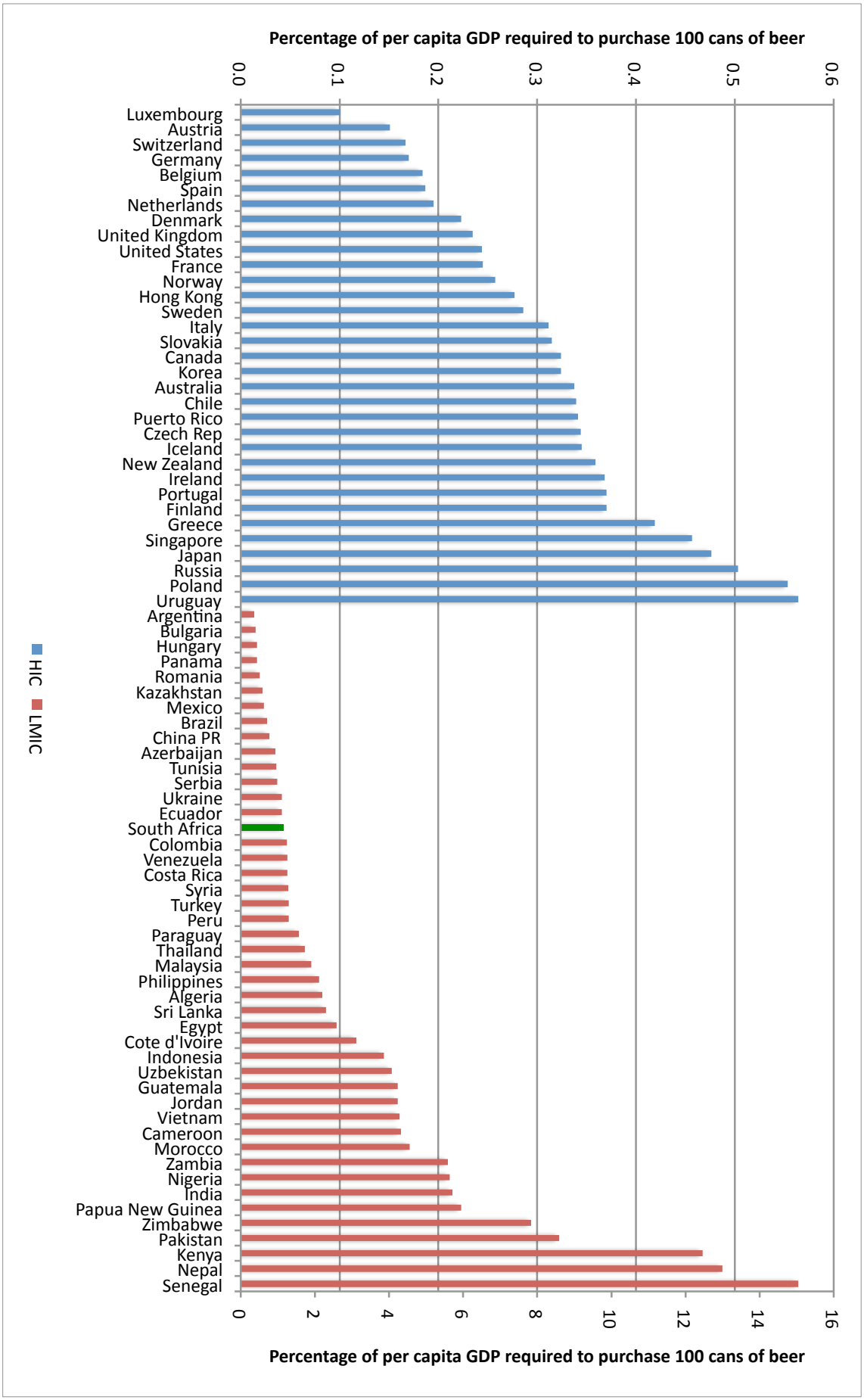
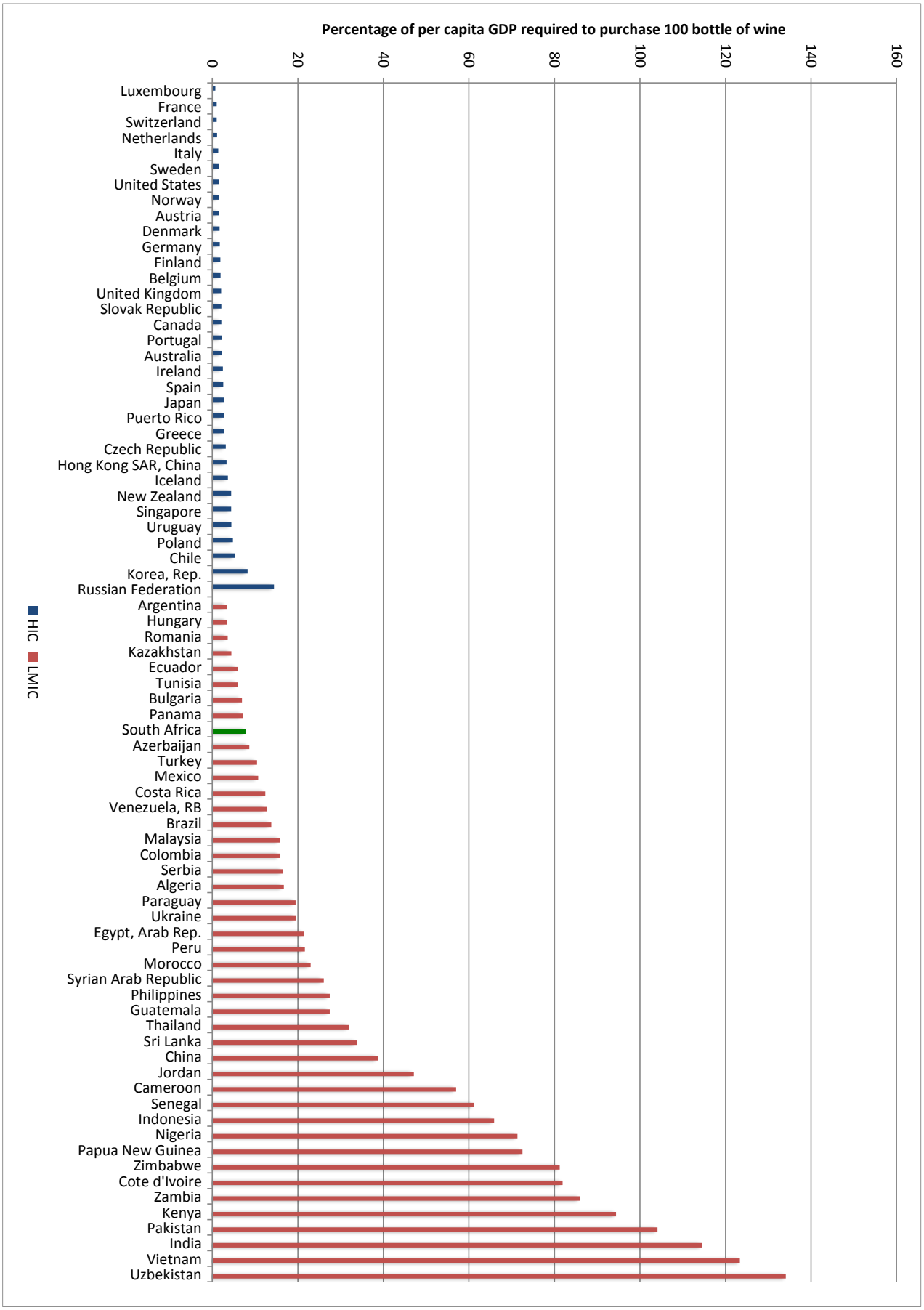
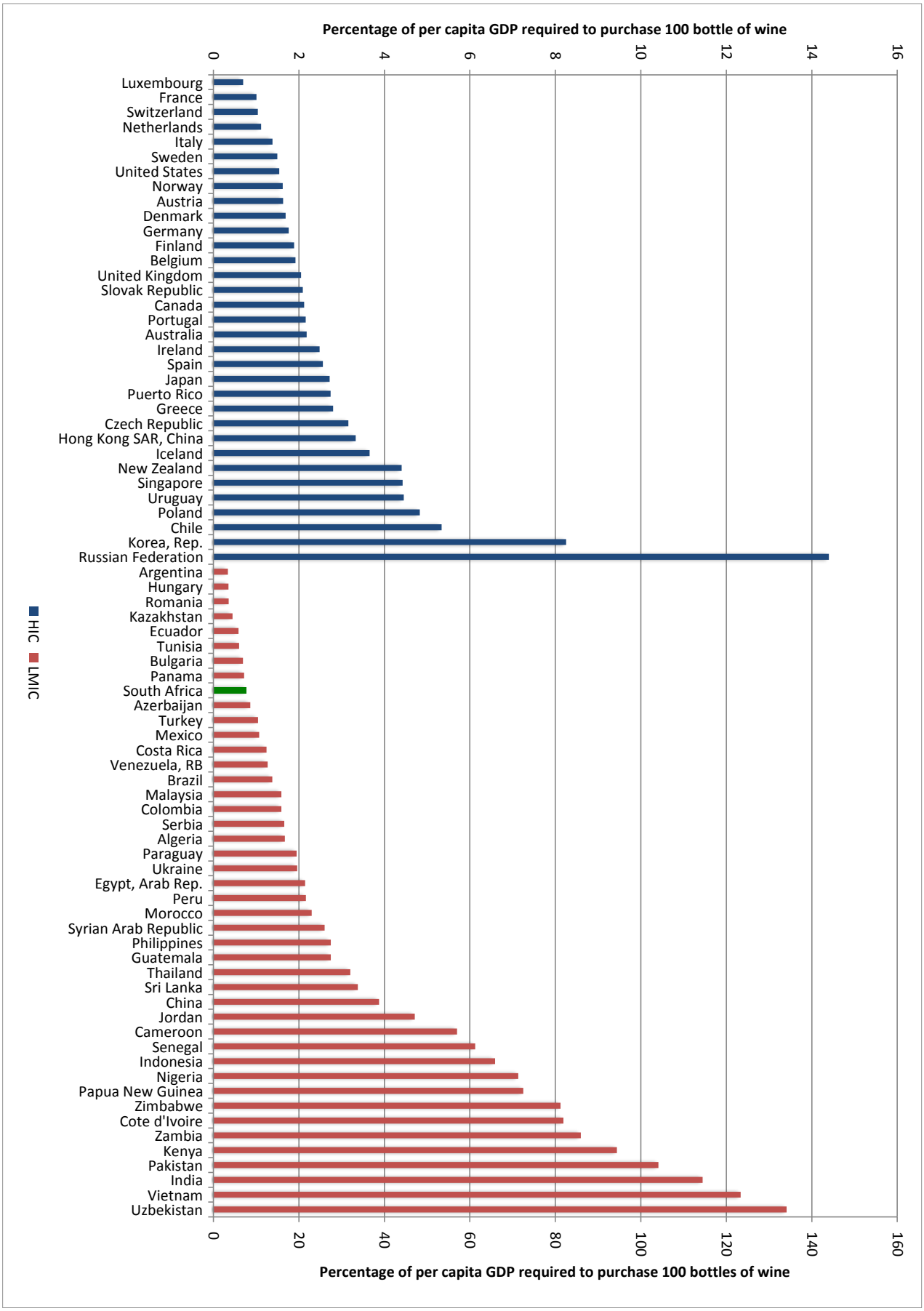


FIGURE 11: RELATIVE INCOME PRICE (RIP) OF WINE IN 2012 (SINGLE AXIS)



Note: Nepal removed since it is an outlier that distorts the figure.

FIGURE 12: RELATIVE INCOME PRICE (RIP) OF WINE IN 2012 (DUAL AXIS)



Note: Nepal removed since it is an outlier that distorts the figure.

FIGURE 13: *RELATIVE INCOME PRICE (RIP) OF GIN IN 2012 (SINGLE AXIS)*

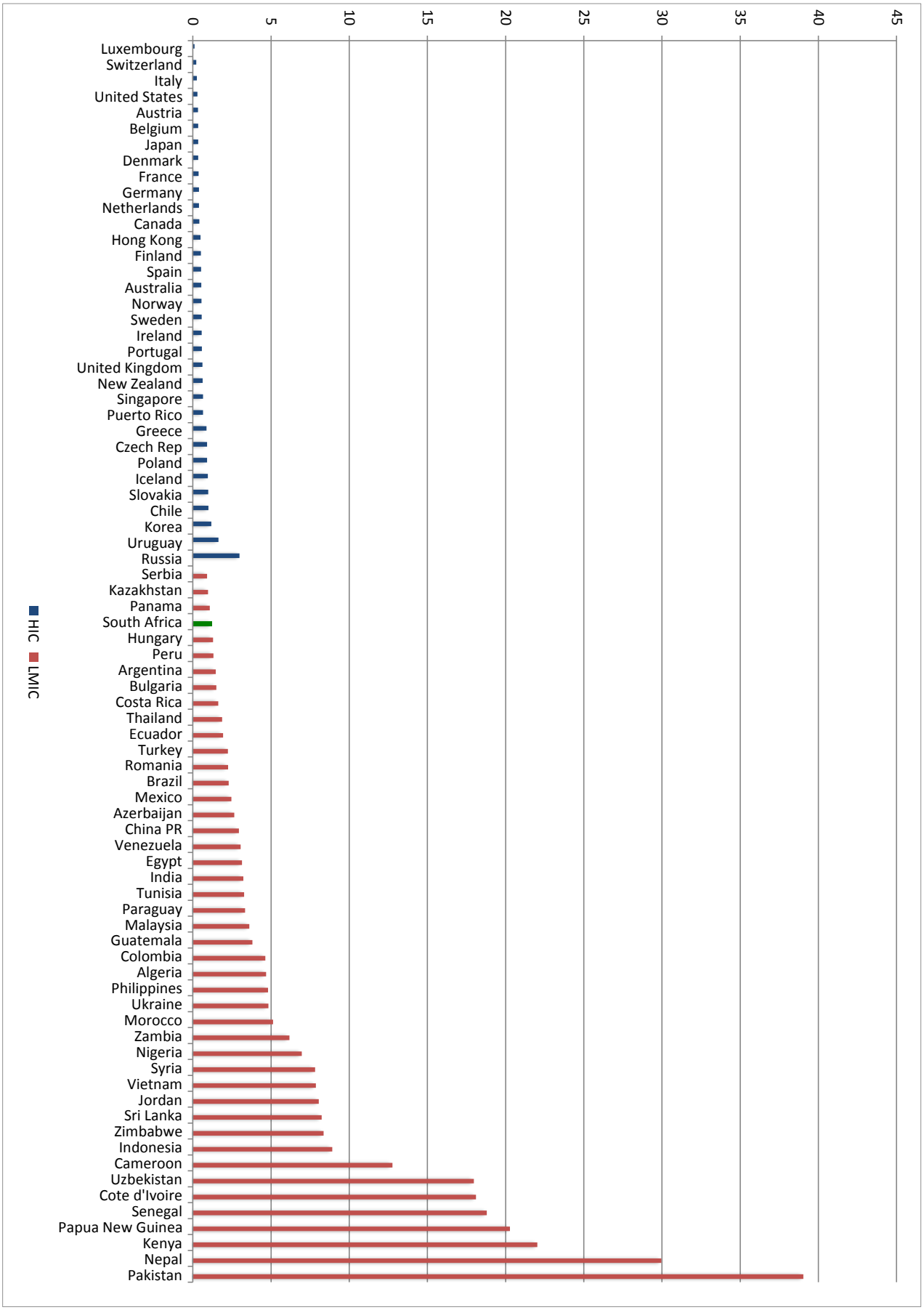


FIGURE 14: RELATIVE INCOME PRICE (RIP) OF GIN IN 2012 (DUAL AXIS)

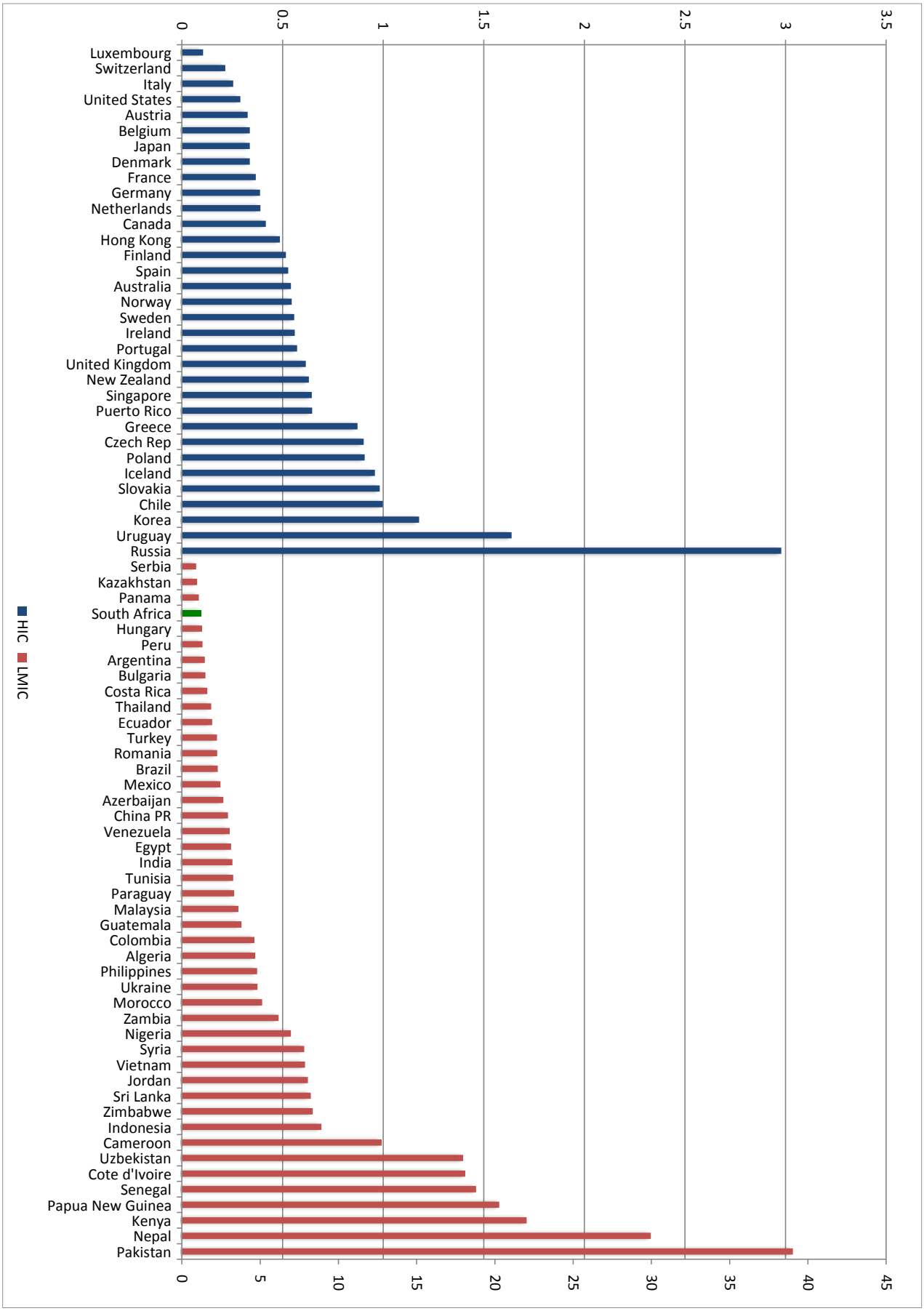


FIGURE 15: RELATIVE INCOME PRICE (RIP) OF WHISKY IN 2012 (SINGLE AXIS)

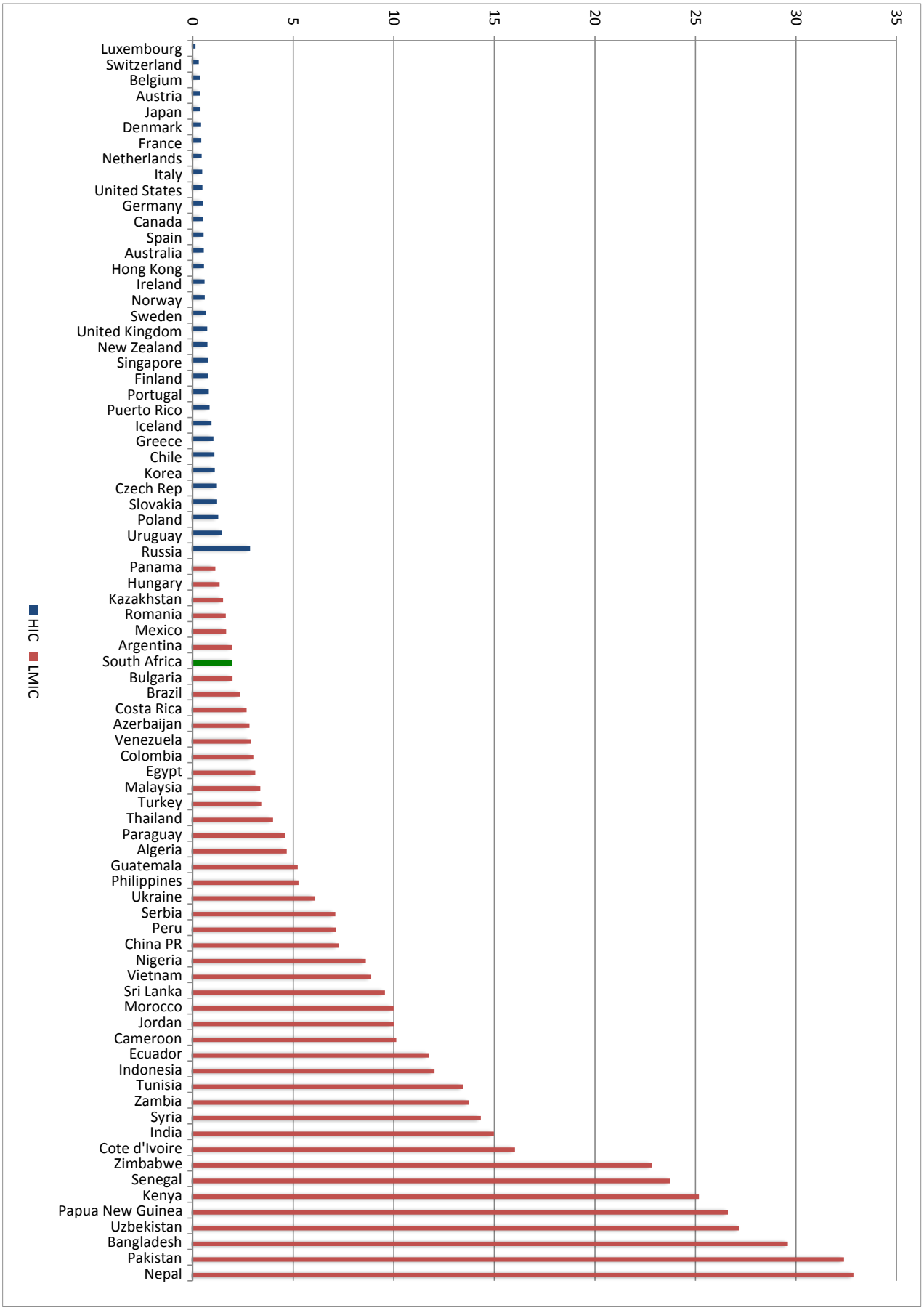


FIGURE 16: RELATIVE INCOME PRICE (RIP) OF WHISKY IN 2012 (DUAL AXIS)

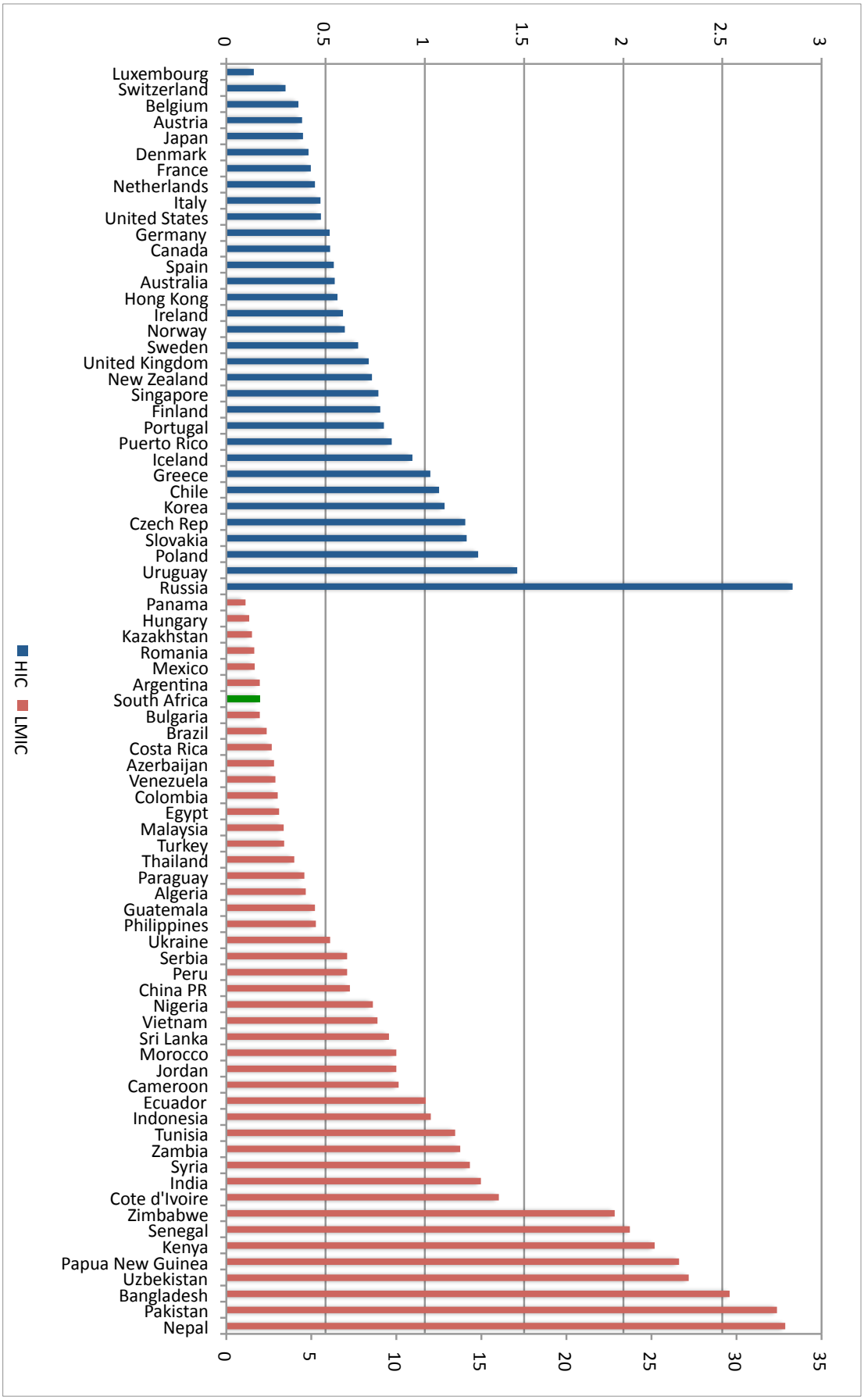


TABLE 3: SUMMARY STATISTICS FOR ALCOHOL AFFORDABILITY (RELATIVE INCOME PRICE) IN 2012

	MEDIAN	MEAN	STANDARD DEVIATION	CV
High-income countries				
Beer	0.33%	0.31%	0.12%	0.37
Wine	2.2%	3.0%	2.6%	0.86
Gin	0.54%	0.67%	0.52%	0.78
Whisky	0.60%	0.76%	0.49%	0.65
Low- and middle-income countries				
Beer	1.72%	3.42%	3.46%	1.07
Wine	21.6%	43.3%	51.4%	1.19
Gin	3.61%	7.09%	8.22%	1.16
Whisky	10.04%	7.10%	9.21%	0.92
LMIC as multiple of HIC				
Beer	5.2	11.0		
Wine	9.8	14.4		
Gin	6.7	10.6		
Whisky	16.7	9.3		

When considering the relative income price, all alcohol products are significantly more affordable, on average and at the median, in high-income countries than in low- and middle-income countries. The scale of the difference in affordability is very large (although primarily driven by the differences in per capita GDP), for example, beer, gin and whisky are, on average, approximately 10 times more affordable in high-income countries than low- and middle-income countries, while wine is approximately 14 times more affordable. This is despite the fact that some alcohol products are more expensive in absolute terms in high-income countries. The explanation lies in the fact that per capita GDP in high-income countries exceeds per capita GDP (in common currency) in low- and middle-income countries by a much greater multiple (almost 8 times for middle-income countries and about 49 times for low-income countries in 2006 for example). Cross-product comparisons are not relevant because of different product sizes and serving volumes.

There is also a large range in the relative income prices for all products. Among high-income countries there is significant variation in all products, although beer shows the lowest cross-country variation and the variation is similar to that of prices among LMICs. The variation in relative income prices is significantly higher than the variation in prices in these countries. This increased variation is due to the significant variation in per capita GDP. While this variation is not, in itself, important, it shows that high-income countries are more homogeneous than low- and middle-income countries. It also shows that it is more difficult to compare low- and middle-income countries to each other.

FIGURE 17: MINUTES OF LABOUR TO PURCHASE BEER IN 2012

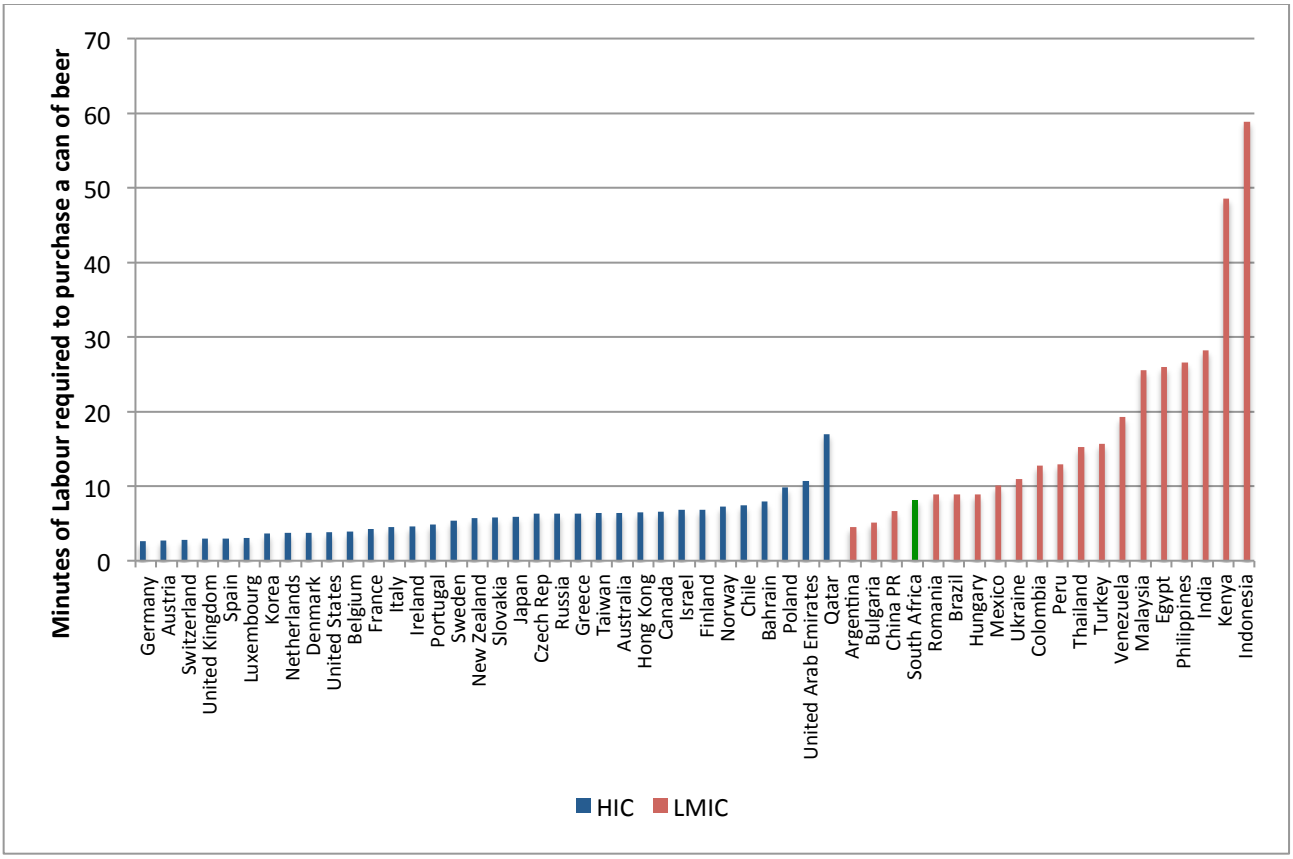
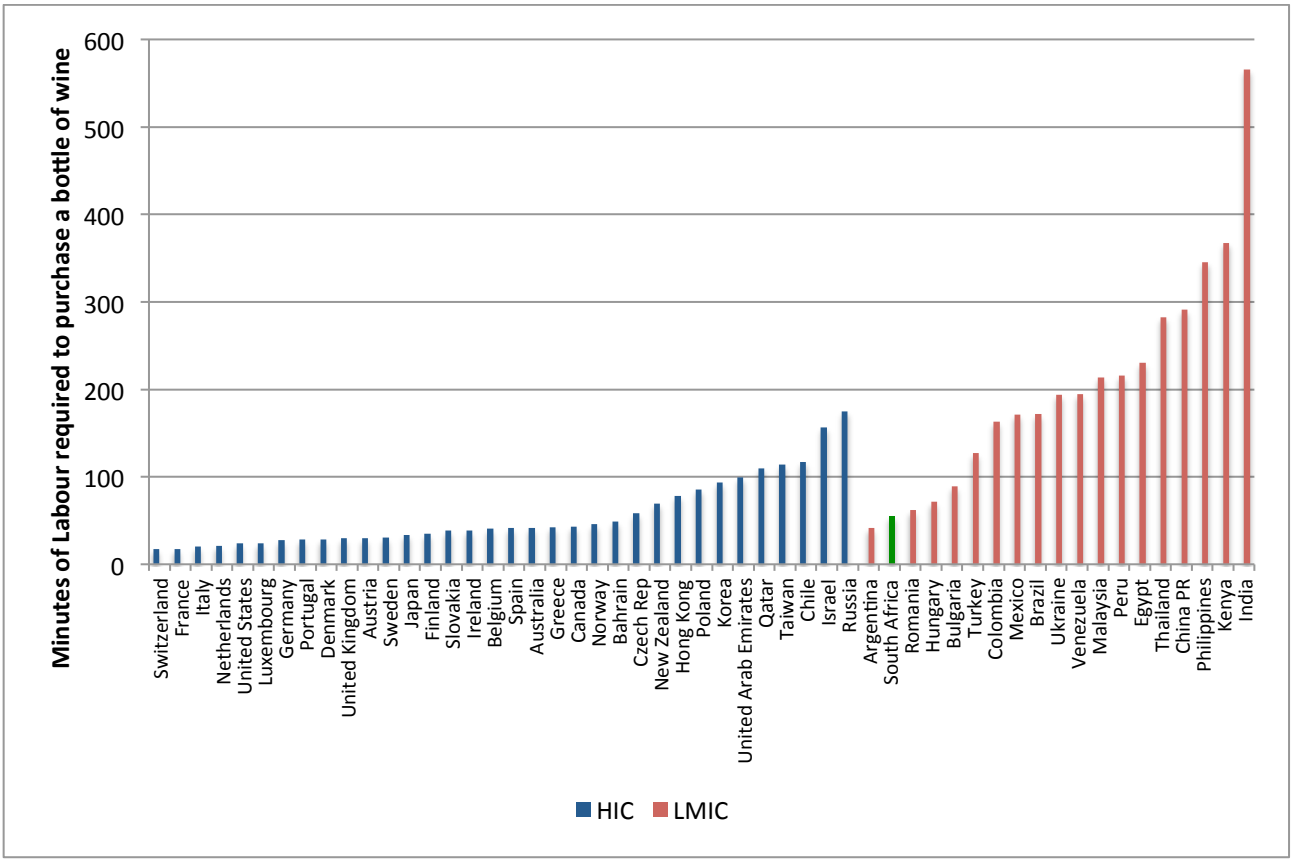
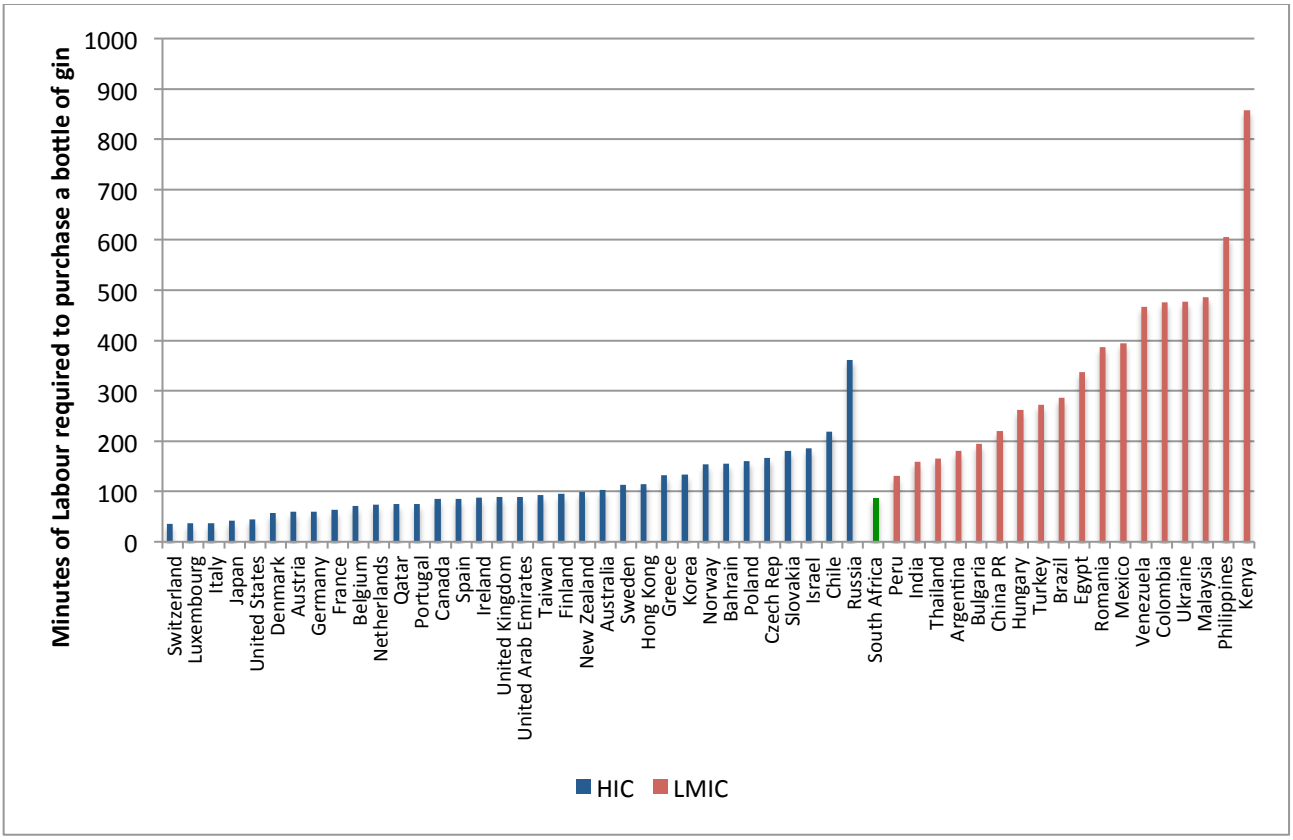


FIGURE 18: MINUTES OF LABOUR REQUIRED TO PURCHASE WINE IN 2012



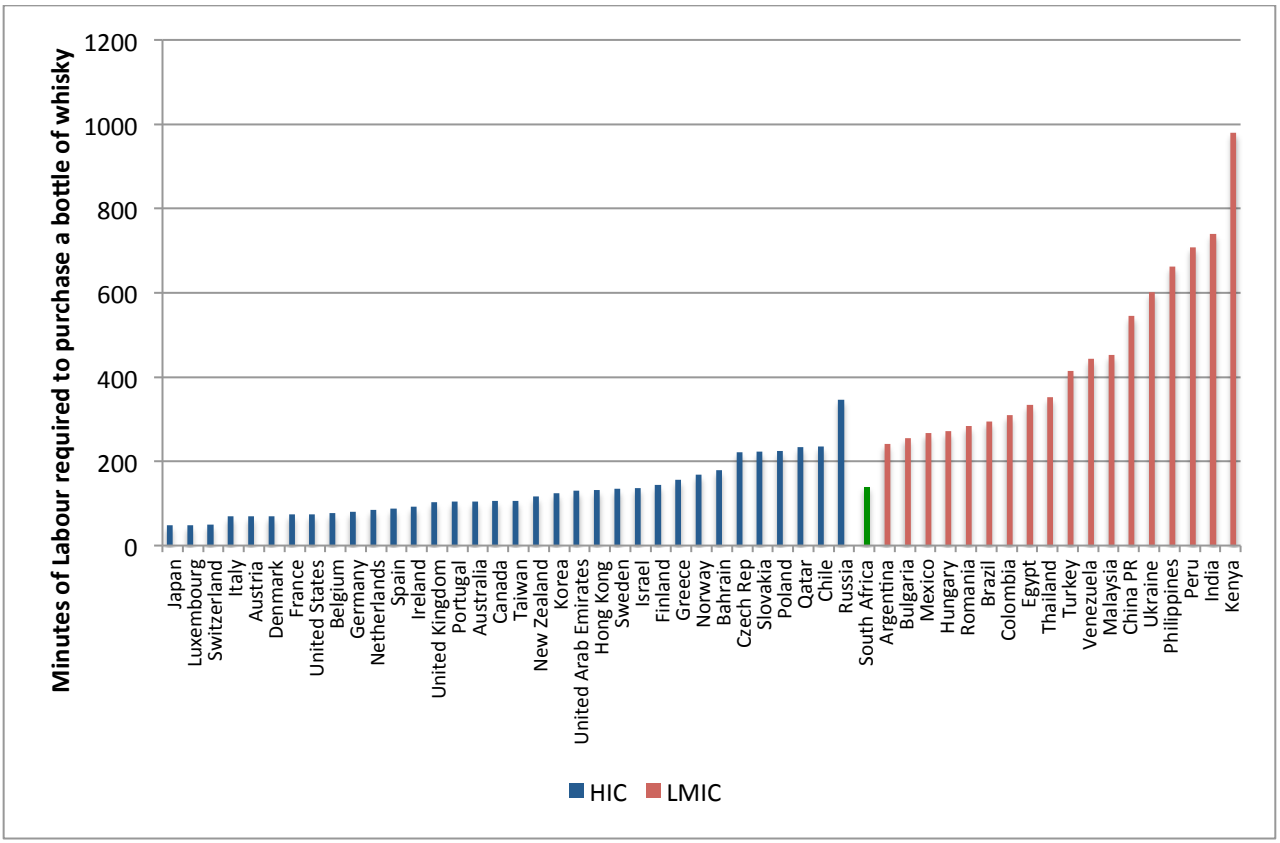
Note: Indonesia removed since it is an outlier that distorts the figure.

FIGURE 19: MINUTES OF LABOUR REQUIRED TO PURCHASE GIN IN 2012



Note: Indonesia removed since it is an outlier that distorts the figure.

FIGURE 20: MINUTES OF LABOUR TO PURCHASE WHISKY IN 2012



Note: Indonesia removed since it is an outlier that distorts the figure.

TABLE 4: SUMMARY STATISTICS FOR ALCOHOL AFFORDABILITY (MINUTES OF LABOUR) IN 2012

	MEDIAN	MEAN	STANDARD DEVIATION	CV
High-income countries				
Beer	5.7	5.8	2.8	0.49
Wine	40.9	55.9	40.3	0.72
Gin	89.2	106.8	65.1	0.61
Whisky	106.4	127.9	67.5	0.53
Low- and middle-income countries				
Beer	12.9	18.1	14.3	0.79
Wine	194.1	242.9	219.0	0.90
Gin	311.5	390.3	294.9	0.76
Whisky	383.2	506.3	376.6	0.74
LMIC as multiple of HIC				
Beer	2.3	3.1		
Wine	4.7	4.3		
Gin	3.5	3.7		
Whisky	3.6	4.0		

The relatively fewer low- and middle-income countries which are included in the UBS dataset prevent us from making as strong conclusions about the minutes of labour method as we did for the relative income price. Again, all alcohol products are significantly more affordable, on average and at the median, in high-income countries than in low- and middle-income countries. However, the scale in the difference between the minutes of labour for each product in high-income and low- and middle-income countries declines significantly when using the minutes of labour calculation. There is also a large variation in the minutes of labour for all products within the two country groups, but the variation is not as great as we saw for the relative income price method.

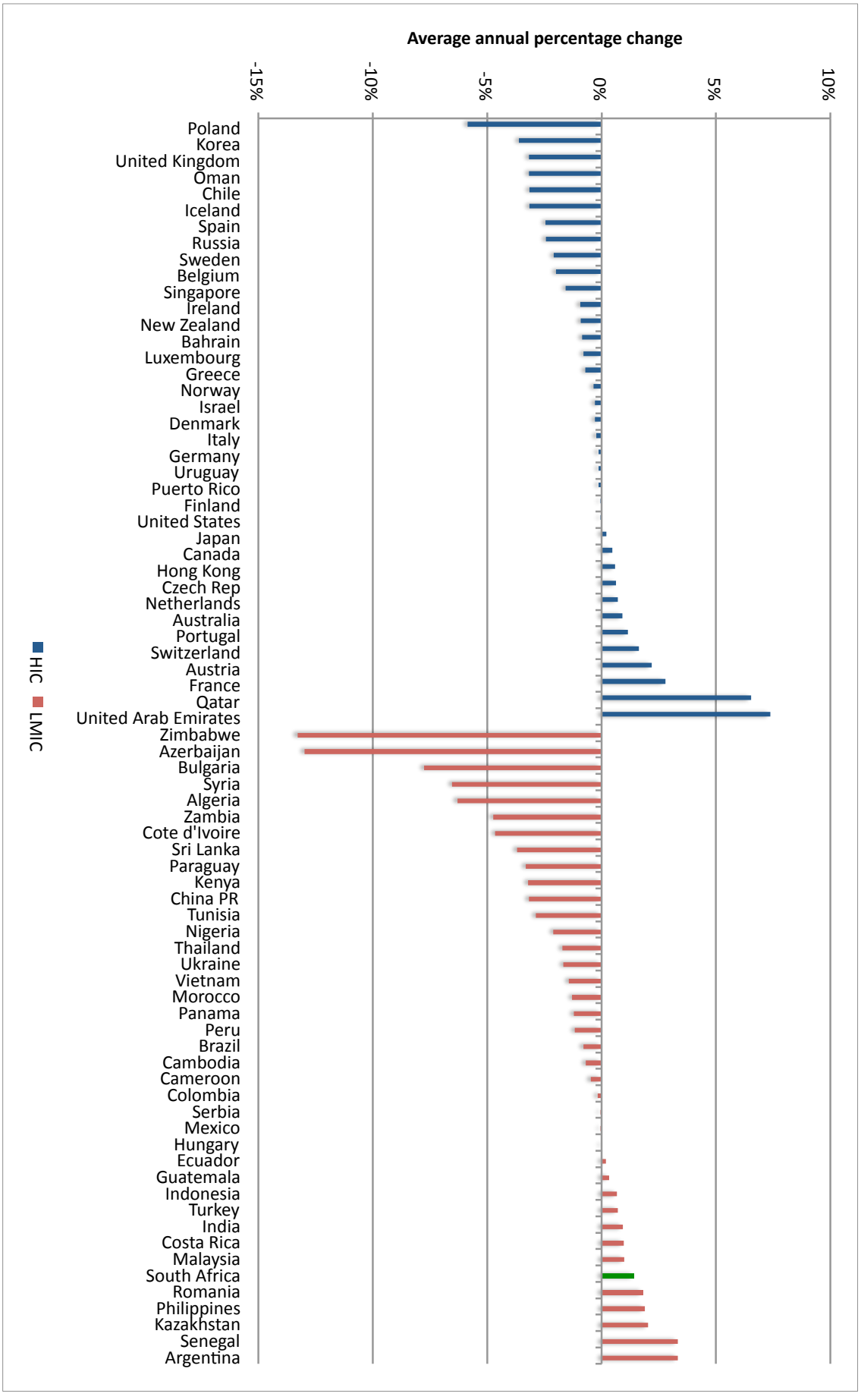
Each method has distinct advantages and disadvantages. It is not a case of either method being better but rather that they measure different things. The relative income price is available for significantly more countries than the minutes of labour, and includes a greater number of low- and middle-income countries, since the underlying measure of income (per capita GDP) is collected in nearly every country in the world. Furthermore, the relative income price is an annual measure while the minutes of labour is discrete, with the income data only collected every three years. This means that the relative income price method can measure cross-country affordability in more countries and more consistently over time than can the minutes of labour method. However, the minutes of labour measurement is more tangible than the relative income price: it is certainly easier to comprehend the time a person (the median person) should work to purchase something rather than a percentage of some measure of income which many people do not understand or could relate to. Furthermore, the minutes of labour method may also allow greater accuracy in countries where high inequalities in income or wealth may drive per capita GDP higher. Alternatively the relative income price might provide greater accuracy in countries where people receive significant social benefits from governments which may not be recorded in wages but are valued as part of GDP.

In their 2009 paper on cigarette affordability, Blecher and Van Walbeek showed that the choice of measure was less important in high-income countries than low- and middle-income countries (i.e. there was greater correlation between the methods in high-income countries than in low- and middle-income countries), but that ultimately there was a high degree of statistical significance which indicated that both measures where measuring the same thing.

2.4.3 TRENDS IN PRICES

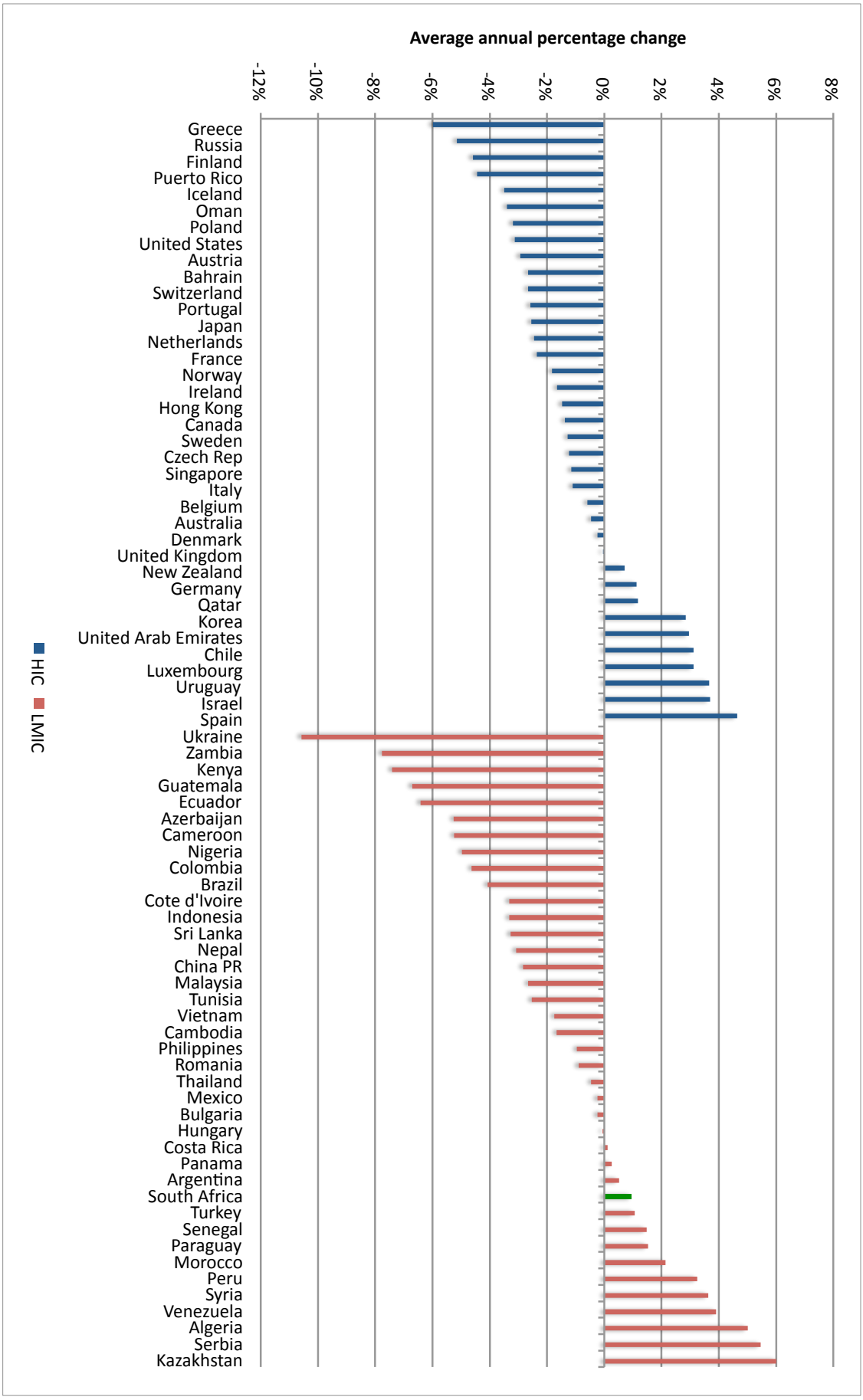
The previous discussion considered prices and affordability measures in the most recent years for which data was available. An equally important issue concerns *trends* in prices and affordability. This section briefly investigates the trends in prices since 1990 (the earliest year for which data are available). However, some countries have shorter time periods. Instead of considering nominal price, as we did previously, we now consider real prices. Nominal prices are converted to real prices using the consumer price index, which adjusts the nominal prices for inflation. This is important since the prices of most, if not all, products will increase over time and thus we should consider the changes in the prices of alcohol products relative to the prices of all other goods and services. The constant growth regression method is used to measure the average annual percentage change in real prices for the four alcohol products. Positive price growth means that alcohol products have become more expensive in real terms, while negative price growth means that alcohol products has become less expensive in real terms. The analysis of trends in real prices is done using local currencies rather than a common currency to give greater accuracy. Figures 21 through 24 show the growth in real beer, wine, gin and whisky prices for individual countries from 1990 to 2012, respectively, although the periods differ for some countries. Countries are sorted, first by development status, and then by growth in real price from smallest (negative) to largest (positive).

FIGURE 21: AVERAGE ANNUAL PERCENTAGE CHANGE IN REAL PRICES OF BEER, 1990-2012



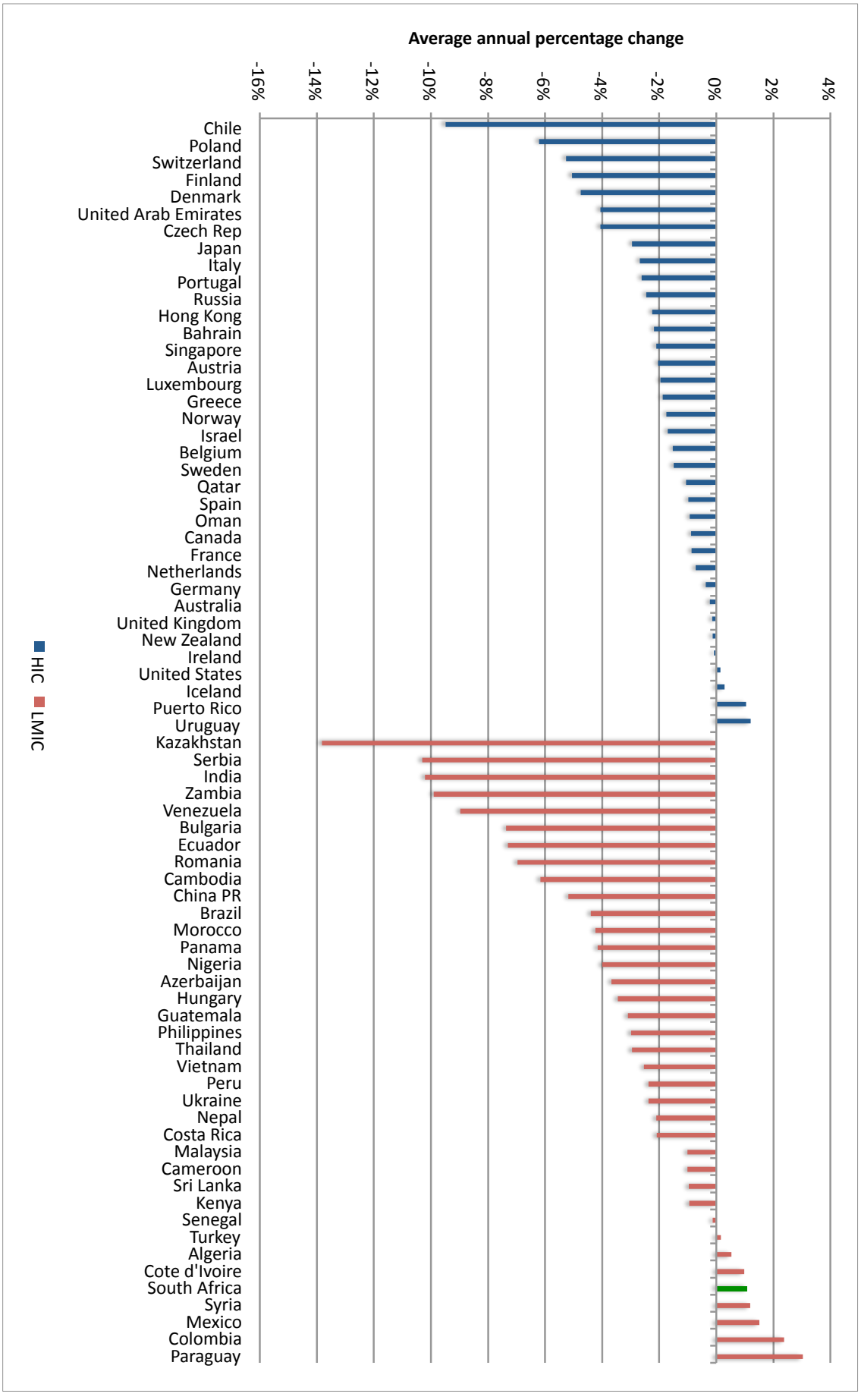
Note: Slovakia and Venezuela have been removed since as outliers they distort the figure.

FIGURE 22: AVERAGE ANNUAL PERCENTAGE CHANGE IN REAL PRICES OF WINE, 1990-2012



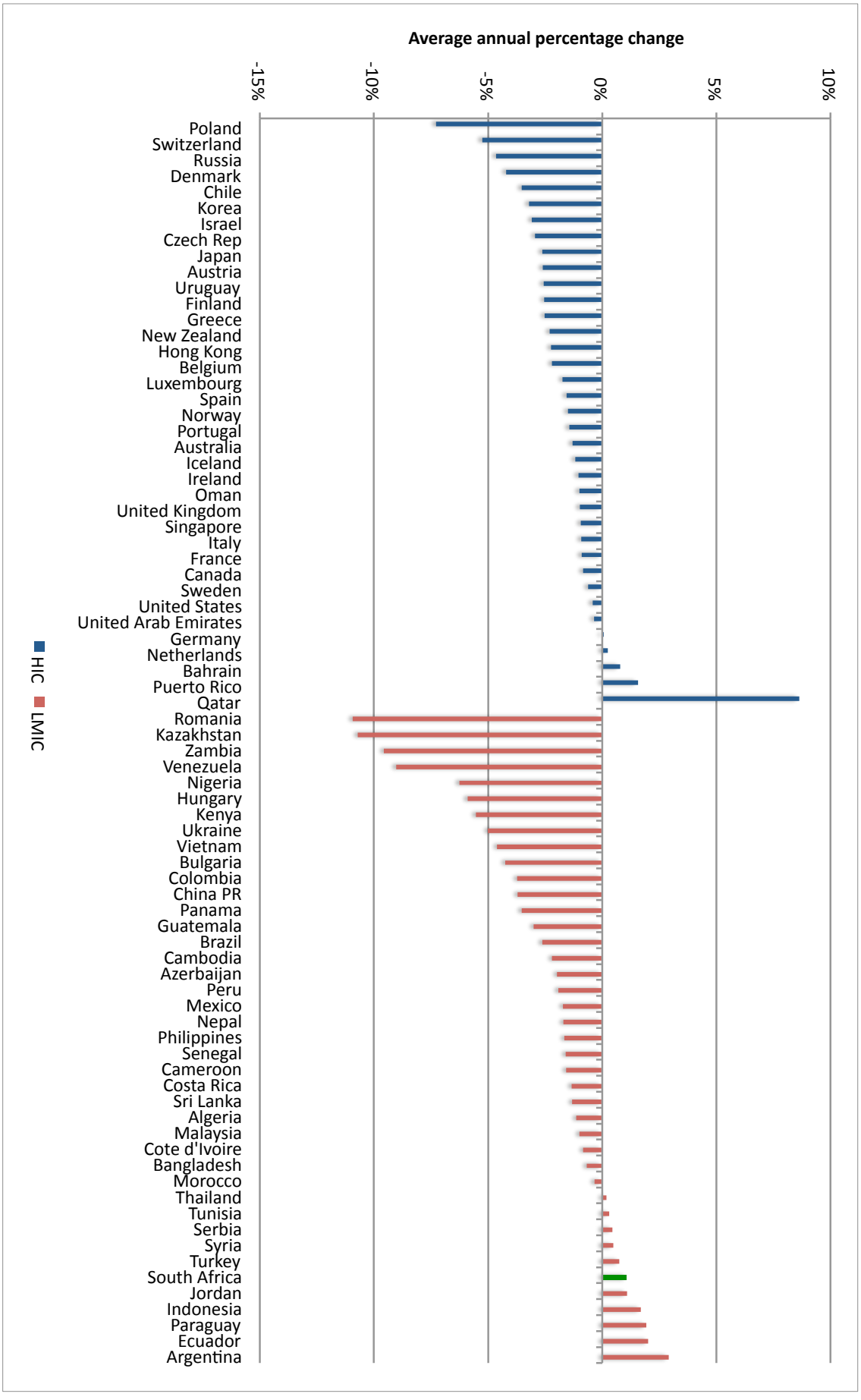
Note: Slovakia and Zimbabwe have been removed since as outliers they distort the figure.

FIGURE 23: AVERAGE ANNUAL PERCENTAGE CHANGE IN REAL PRICES OF GIN, 1990-2012



Note: Slovakia and Zimbabwe have been removed since as outliers they distort the figure.

FIGURE 24: AVERAGE ANNUAL PERCENTAGE CHANGE IN REAL PRICES OF WHISKY, 1990-2012



Note: Slovakia and Zimbabwe have been removed since as outliers they distort the figure.

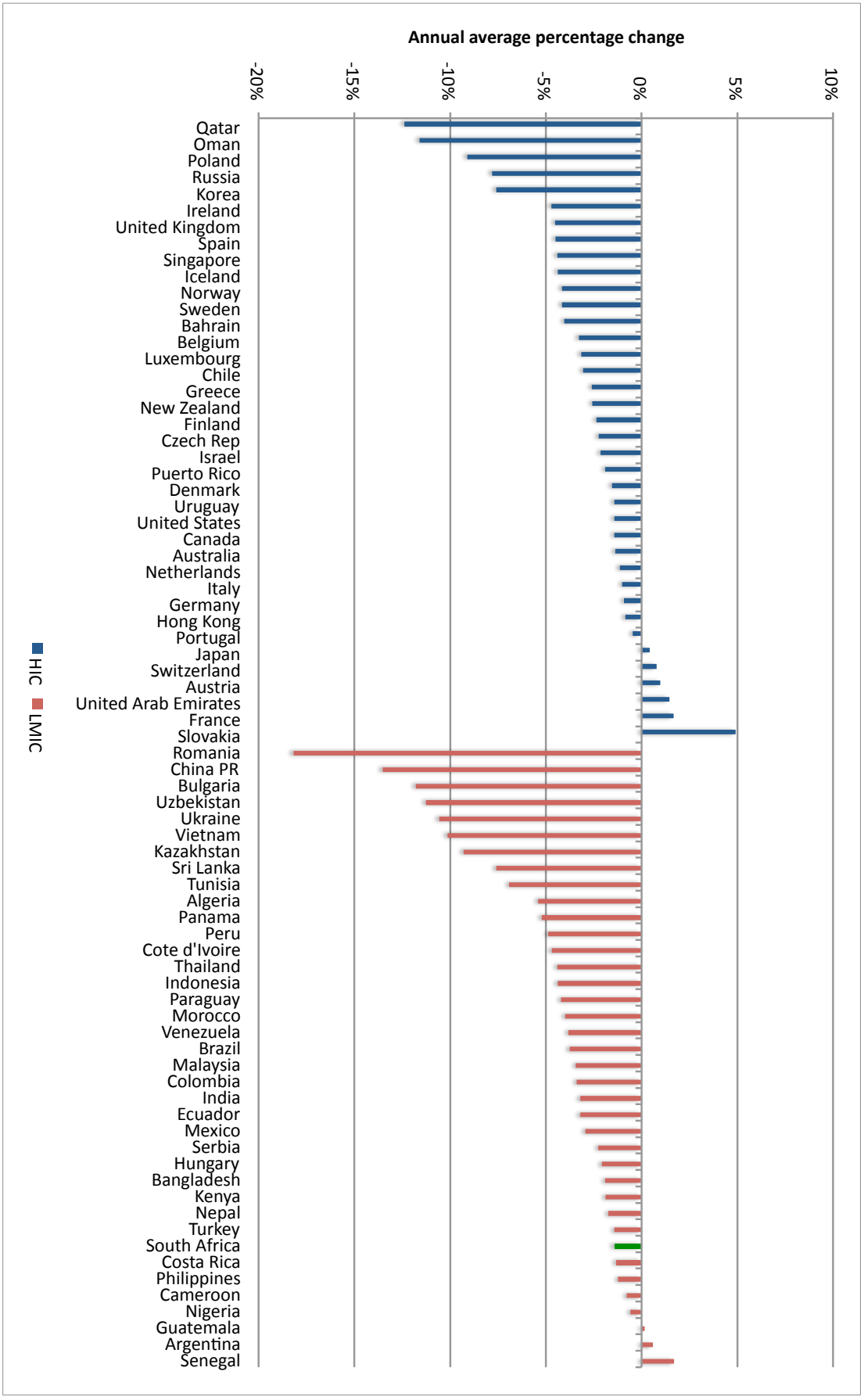
Alcohol products have become cheaper in real terms in the majority of high-income and low- and middle-income countries since 1990. However, the size of this majority and the scale of change vary between products. Beer has become more expensive in 11 of the 38 (29%) high-income countries, and in 14 of 39 (36%) low- and middle-income countries. Wine became more expensive in 10 of the 38 (26%) high-income countries, and in 13 of 40 (33%) low- and middle-income countries. Gin became more expensive in 4 of the 37 (11%) high-income countries and in 7 of 38 (18%) low- and middle-income countries. Whisky became more expensive in 5 of 38 (13%) high-income countries and in 11 of 42 (26%) low- and middle-income countries. The magnitudes indicate that all four products became cheaper more rapidly (on average) in low- and middle-income countries than in high-income countries, even though a greater proportion of high-income countries saw alcohol products become cheaper than in low- and middle-income countries. Among high-income countries, some of the countries which have seen alcohol become cheaper more rapidly include a number of countries which have only recently been classified as high-income countries, including Poland, Russia and Chile.

2.4.4 TRENDS IN AFFORDABILITY

This section investigates trends in the affordability of alcohol products since 1990. The relative income price has annual observations from 1990 to 2012, while the minutes of labour measure only allows us to make an analysis from 1997 to 2012 since the income measure used for this is discrete and is only available for the years 1997, 2000, 2003, 2006, 2009 and 2012. The constant growth regression method is used to measure the average annual percentage change in affordability for the four alcohol products. Positive growth values mean that alcohol products have become less affordable, while negative growth values means that alcohol products have become more affordable.

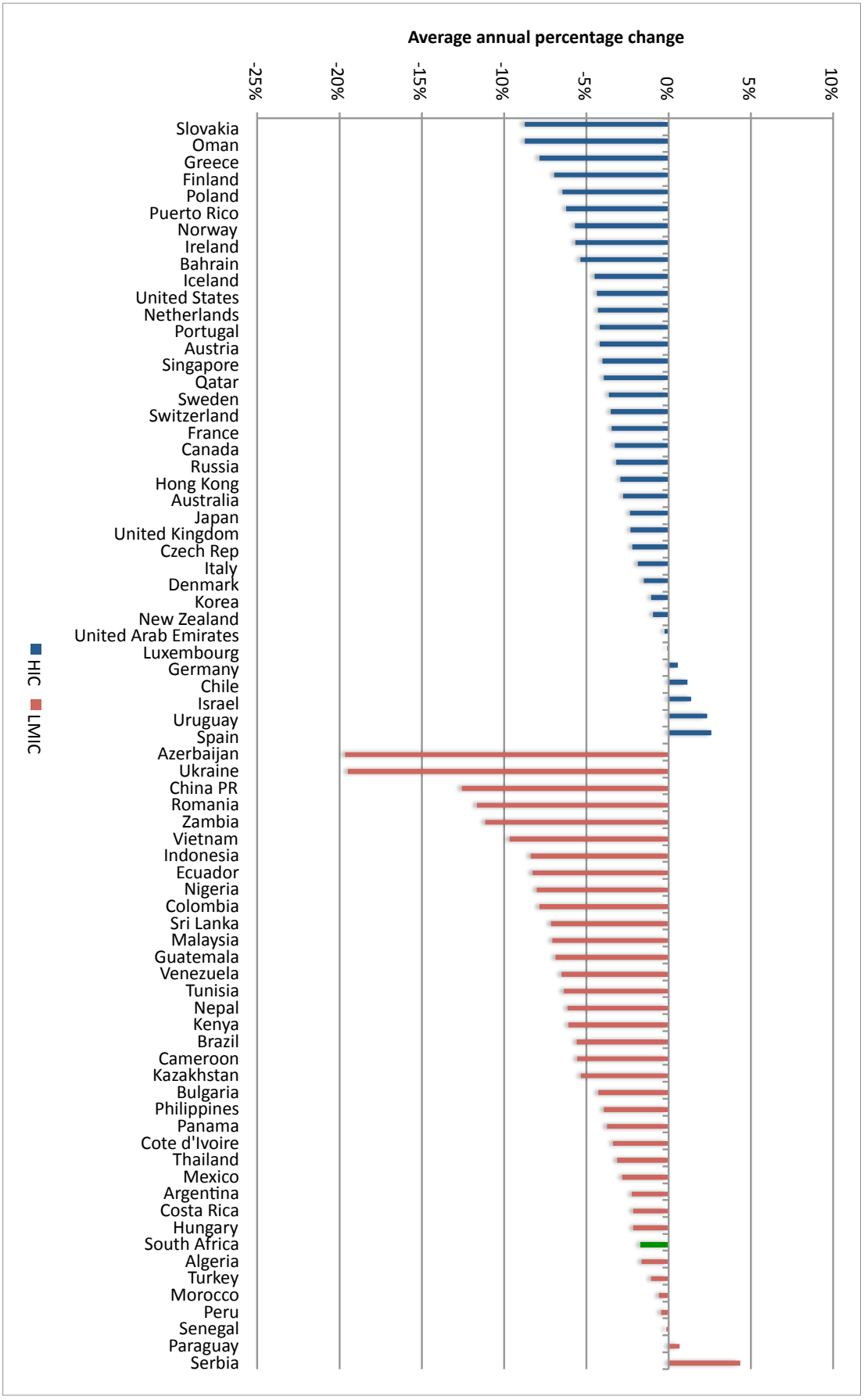
Figures 25 through 28 show the change in affordability in beer, wine, gin and whisky prices for individual countries from 1990 to 2012, using the relative income price method. Figures 29 through 32 show the change in affordability in beer, wine, gin and whisky for individual countries from 1997 to 2012, using the minutes of labour method. As usual, countries are sorted, first by development status, and then by growth in the affordability measure from smallest (negative) to largest (positive).

FIGURE 25: AVERAGE ANNUAL PERCENTAGE CHANGE IN AFFORDABILITY (RELATIVE INCOME PRICE) OF BEER, 1990-2012



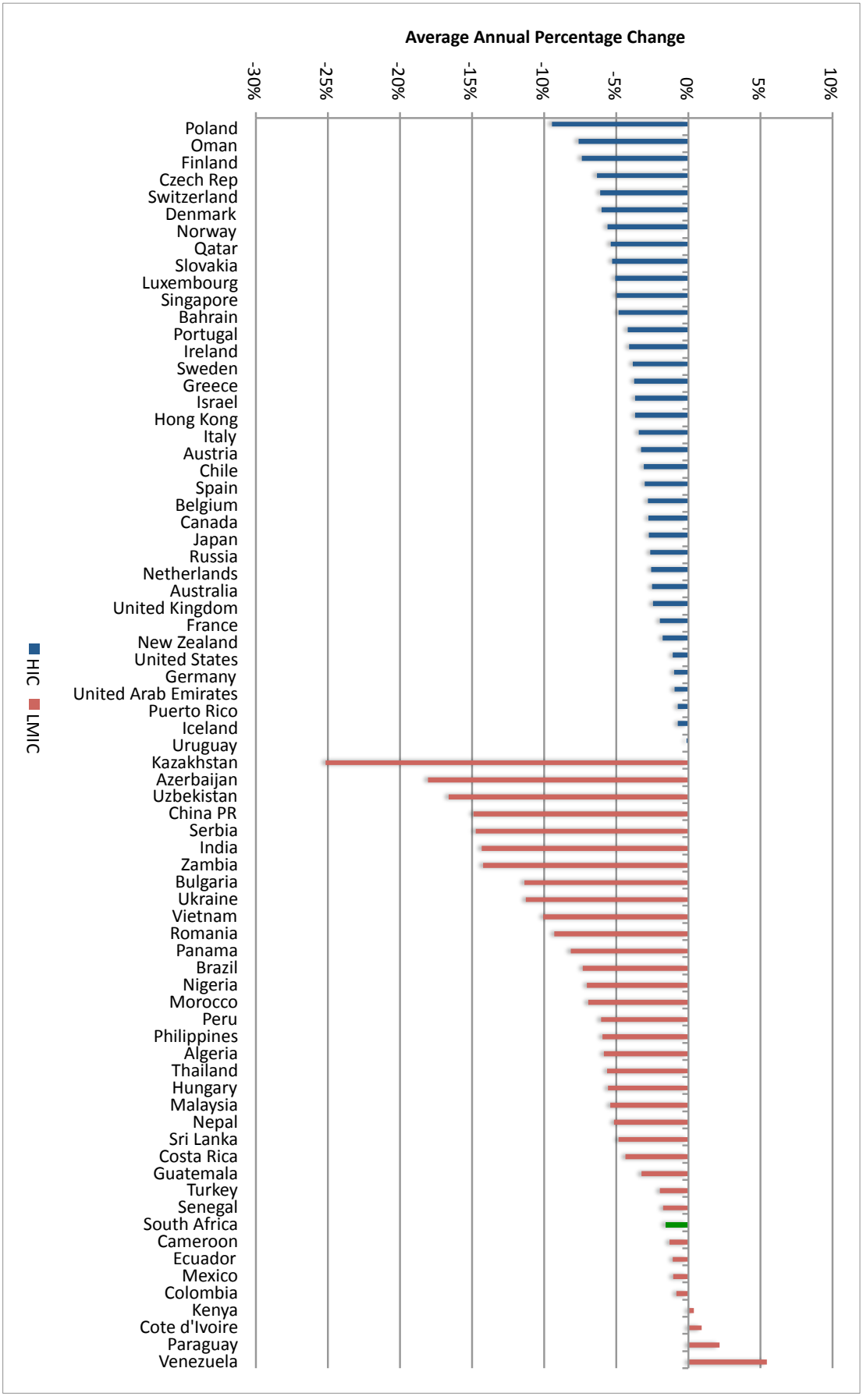
Note: Azerbaijan and Zimbabwe have been removed since as outliers they distort the figure.

FIGURE 26: AVERAGE ANNUAL PERCENTAGE CHANGE IN AFFORDABILITY (RELATIVE INCOME PRICE) OF WINE 1990-2012



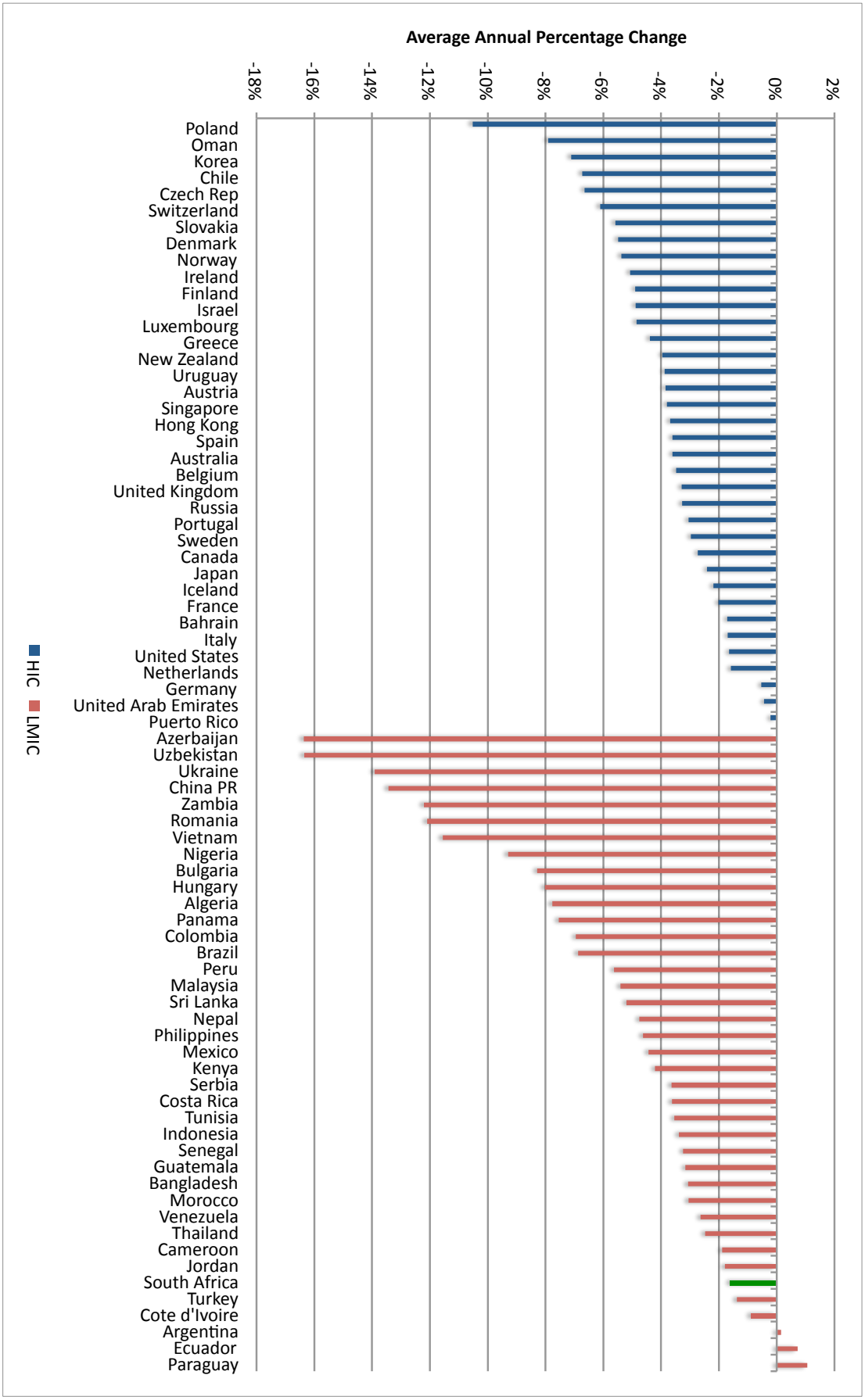
Note: Zimbabwe has been removed since as an outlier it distorts the figure.

FIGURE 27: *AVERAGE ANNUAL PERCENTAGE CHANGE IN AFFORDABILITY (RELATIVE INCOME PRICE) OF GIN, 1990-2012*



Note: Zimbabwe has been removed since as an outlier it distorts the figure.

FIGURE 28: AVERAGE ANNUAL PERCENTAGE CHANGE IN AFFORDABILITY (RELATIVE INCOME PRICE) OF WHISKY, 1990-2012

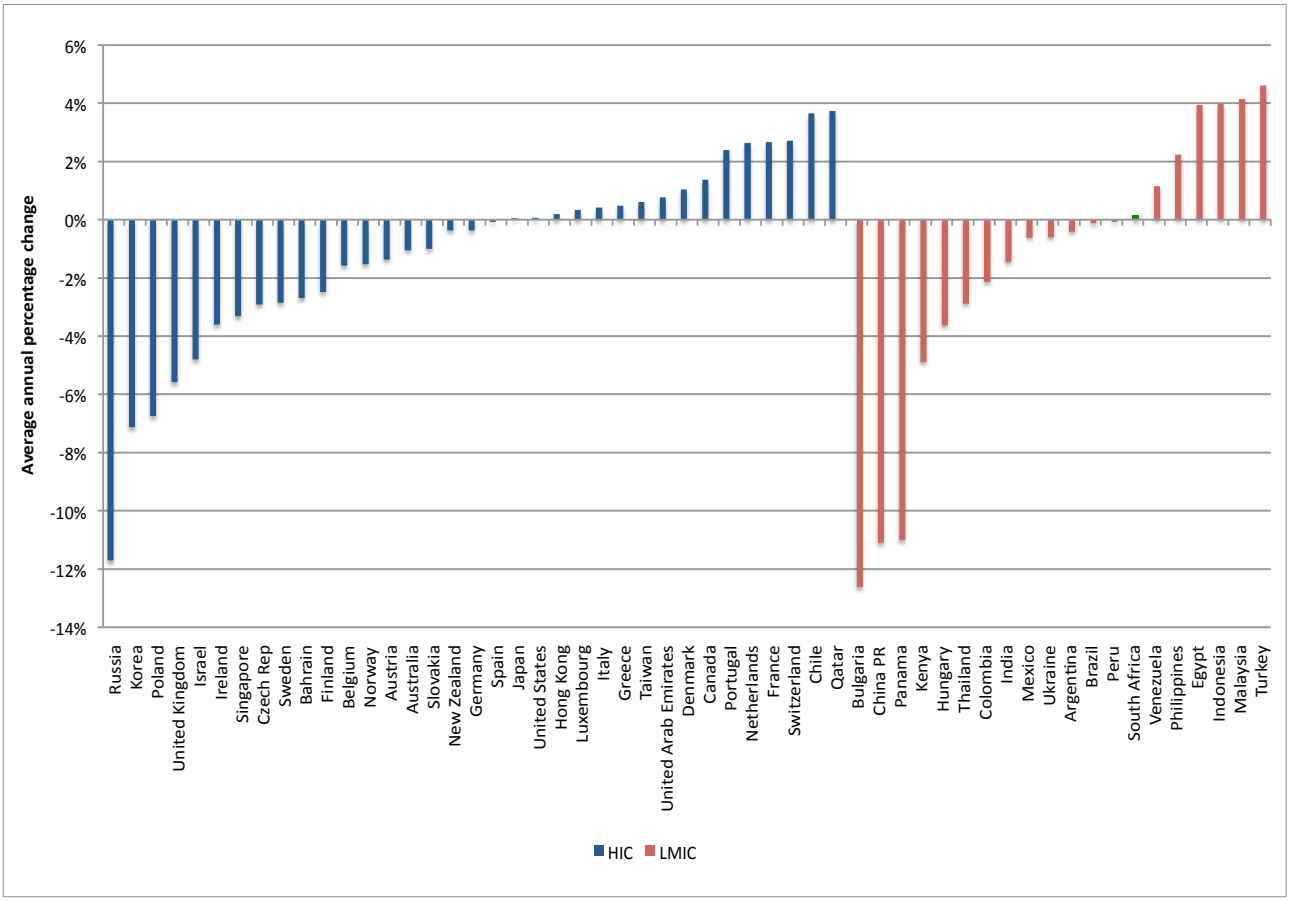


Note: Kazakhstan, Qatar and Zimbabwe has been removed since as outliers they distort the figure.

Alcohol products became more affordable in nearly all high-income and all low- and middle-income countries, and dramatically so. Beer became more affordable in 32 of the 38 (84%) high-income countries and in 35 of 39 (90%) low- and middle-income countries. Wine became more affordable in 32 of the 37 (86%) high-income countries and more affordable in 35 of 38 (92%) low- and middle-income countries. Gin became more affordable in all high-income countries (37) and became more affordable in 37 of 41 (90%) low- and middle-income countries. Whisky became more affordable in all high-income countries and more affordable in 36 out of 39 (92%) of low- and middle-income countries.

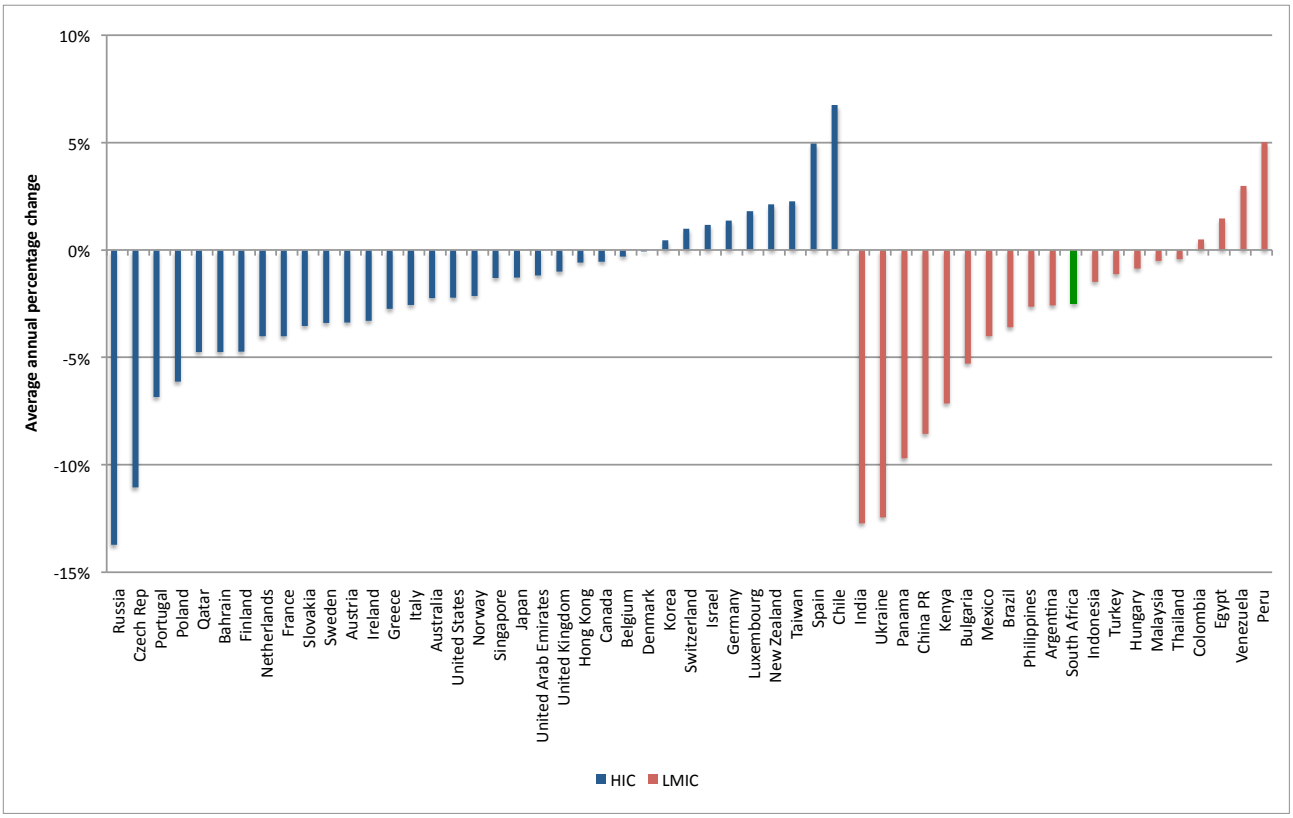
To some extent this is not a surprising result given that we saw real prices declining in the majority of countries. Increases in incomes (which occur in nearly all countries over time) augment this to make alcohol more affordable. However, the magnitudes are also staggering with many countries have experienced very rapid increases in affordability. In most cases, the increases in affordability can be ascribed to a combination of rapid increases in incomes and rapid declines in the real price of alcohol products.

FIGURE 29: AVERAGE ANNUAL PERCENTAGE CHANGE IN AFFORDABILITY (MINUTES OF LABOUR) OF BEER, 1997-2012



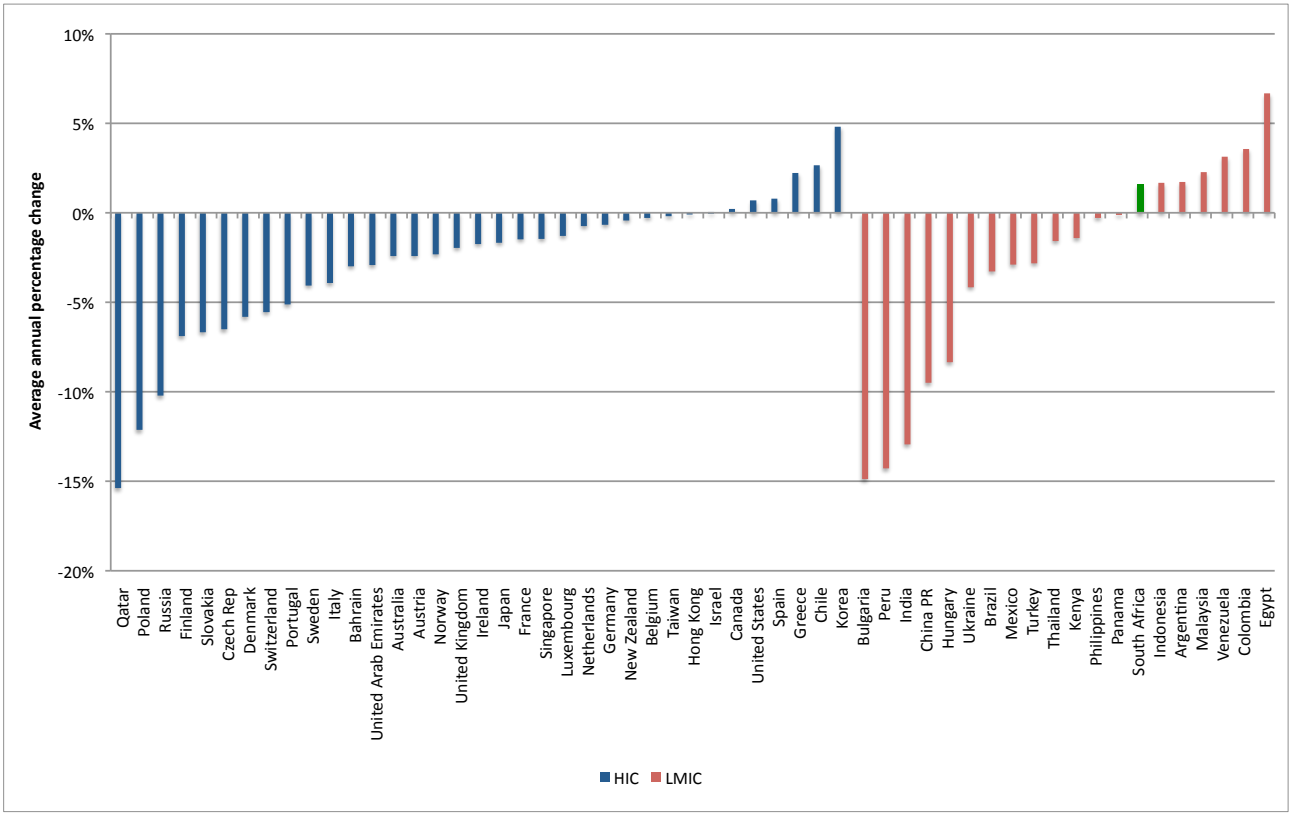
Note: Romania has been removed since as an outlier it distorts the figure.

FIGURE 30: AVERAGE ANNUAL PERCENTAGE CHANGE IN AFFORDABILITY (MINUTES OF LABOUR) OF WINE, 1997-2012



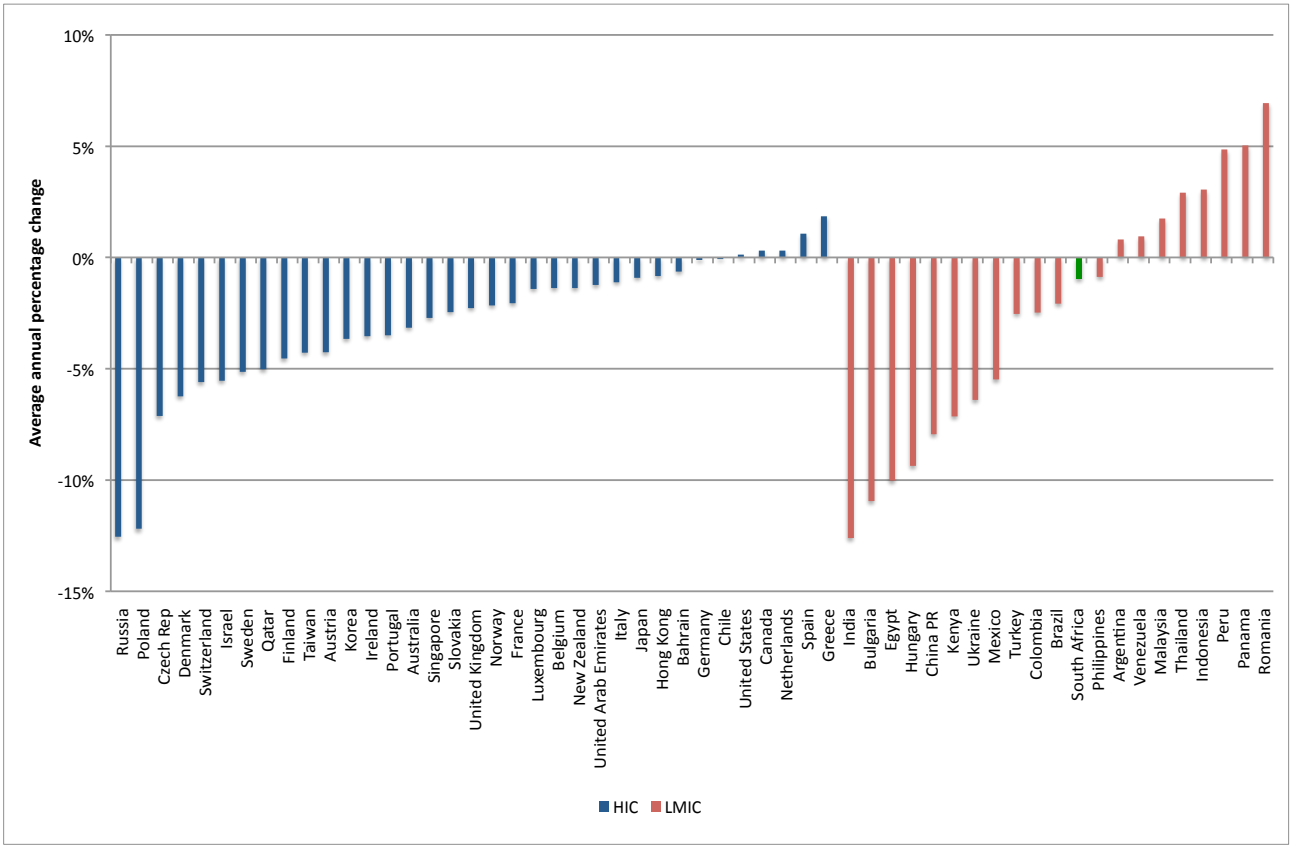
Note: Romania has been removed since as an outlier it distorts the figure.

FIGURE 31: AVERAGE ANNUAL PERCENTAGE CHANGE IN AFFORDABILITY (MINUTES OF LABOUR) OF GIN, 1997-20



Note: Romania has been removed since as an outlier it distorts the figure.

FIGURE 32: *AVERAGE ANNUAL PERCENTAGE CHANGE IN AFFORDABILITY (MINUTES OF LABOUR) OF WHISKY, 1997-2012*



Using the alternative minutes of labour methodology to measure the affordability of alcohol products, we find that all alcohol products have, on average, become more affordable in both high-income and low- and middle-income countries. However, we find that the proportion of countries which saw alcohol become more affordable is lower than it is for relative income prices, particularly in low- and middle-income countries.

Specifically, beer became more affordable in 19 of the 35 (54%) high-income countries, while in low- and middle-income countries beer became more affordable in 13 of 21 countries (62%). Wine became more affordable in 25 of the 35 (71%) high-income countries, while in low- and middle-income countries wine became more affordable in 16 of 21 countries (76%). Gin became more affordable in 28 of 35 (80%) high-income countries, and in low- and middle-income countries gin became more affordable in 13 of 21 countries (62%). Whisky became more affordable in 30 of 35 high-income countries (86%) and in low- and middle-income countries whisky became more affordable in 13 of 21 countries (62%). This difference is ascribed to wages, as measured by the UBS survey, not rising as quickly as per capita GDP in many countries. Increases in per capita GDP might be driven by very high income earners who are not as well represented in the survey.

3. AFFORDABILITY OF ALCOHOL PRODUCTS IN SOUTH AFRICA

One important purpose of this analysis is to compare South Africa to other countries, including its peer countries in terms of level of development. Table 5 ranks South Africa with all countries as well as fellow low- and middle-income countries, using both methods for measuring affordability (relative income price

and the minutes of labour), for all four major product groups in 2012. The ranking is from most affordable to least affordable, i.e. lower rankings mean that the product in South Africa is relatively more affordable than in other countries.

Importantly, the minutes of labour method shows South African alcohol products to be more affordable than the relative income price measures. That aside, alcohol products are generally more affordable in South Africa than in the majority of low- and middle-income countries, and it is within the 10th percentile for wine, gin and whisky, and the 20th percentile for beer using the minutes of labour method. South Africa is within the 20th percentile for wine, gin and whisky, and the 33rd percentile for beer for the relative income price. While one should be conservative about making absolute statements regarding affordability, it is clear, using one method (the minutes of labour) that South Africa has the most affordable gin and whisky in the low- and middle-income world, the second most affordable wine, and fourth most affordable beer. We can thus conclude that, in absolute terms, alcohol is very affordable in South Africa compared to other low- and middle-income countries.

TABLE 5: AFFORDABILITY RANKINGS IN SOUTH AFRICA IN 2012

	BEER	WINE	GIN	WHISKY
Relative Income Price				
All countries				
SA rank	48/78	40/78	35/78	39/79
Percentile	62nd	51st	45th	49th
LMIC				
SA rank	15/45	9/45	4/45	7/46
Percentile	33rd	20th	9th	15th
Minutes of Labour				
All countries				
SA rank	35/54	25/54	16/54	25/54
Percentile	65th	46th	30th	46th
LMIC				
SA rank	4/20	2/20	1/20	1/20
Percentile	20th	10th	5th	5th

One is also able to view the trends in how the affordability of alcohol products in South Africa compares to other countries. Figures 33 through 40 show the affordability of beer, wine, gin and whisky, respectively, using both the relative income price and minutes of labour method from 1990-2012 and 1997-2012. The metrics used are the affordability measures calculated for South Africa compared to the median high-income and median low- and middle-income countries.

FIGURE 33: *AFFORDABILITY OF BEER (RELATIVE INCOME PRICE) IN SOUTH AFRICA, 1990-2012*

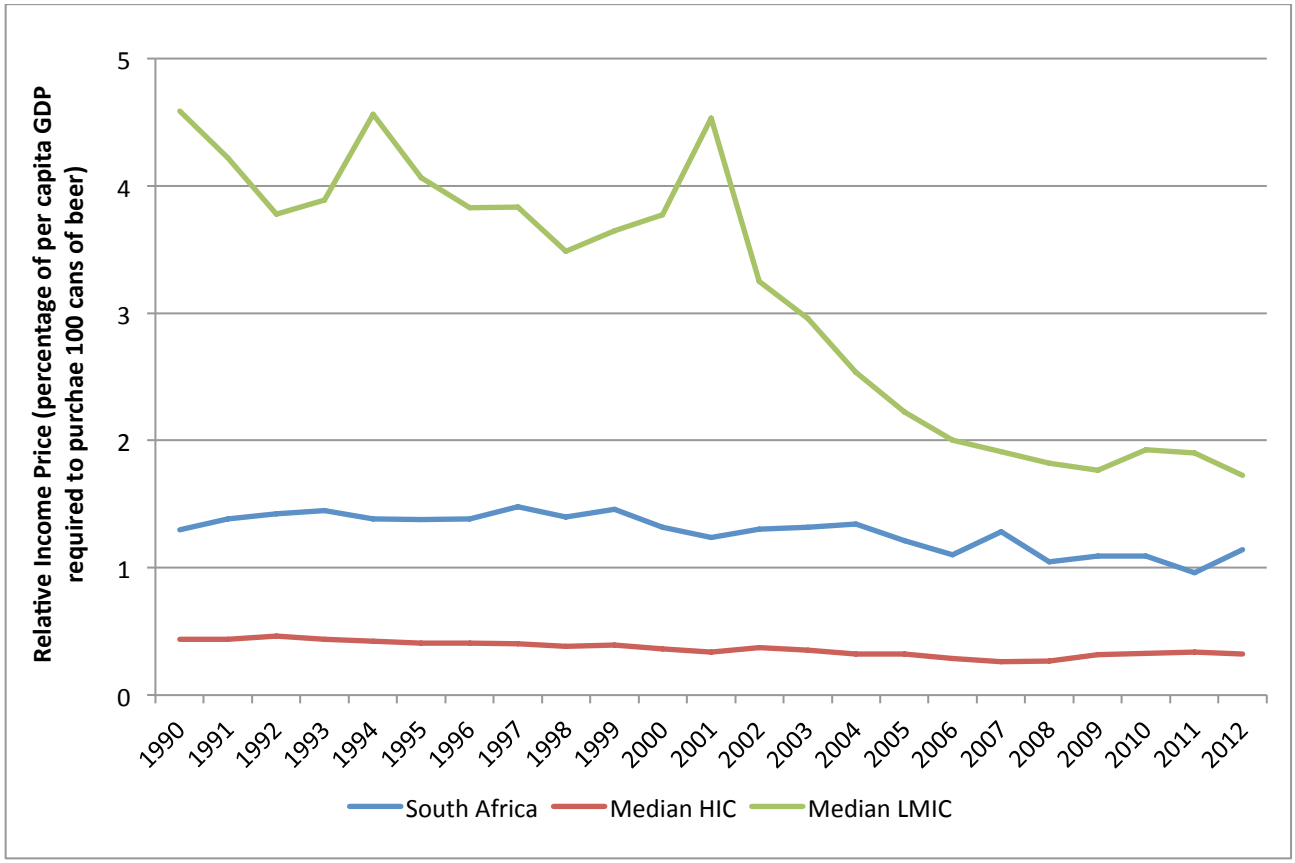
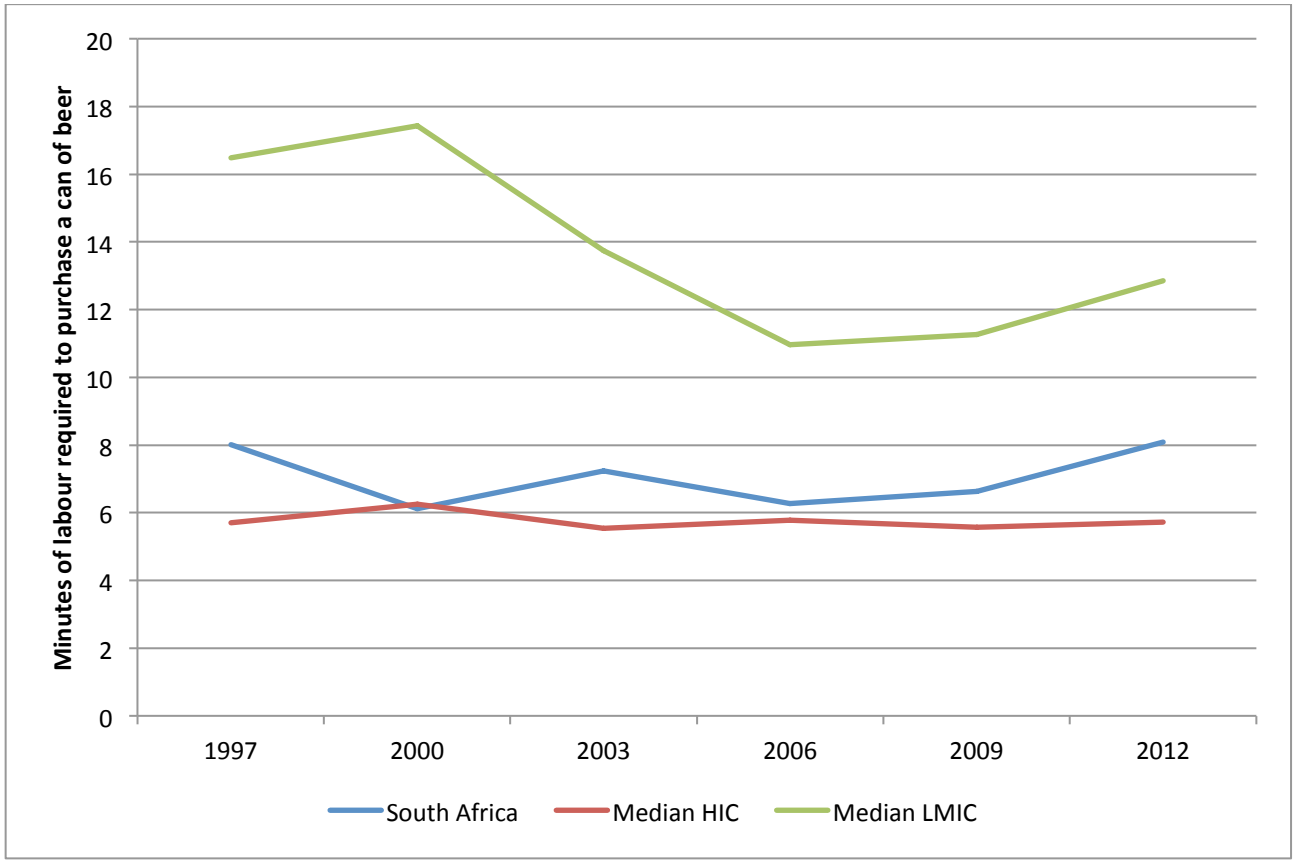


FIGURE 34: *AFFORDABILITY OF BEER (MINUTES OF LABOUR) IN SOUTH AFRICA, 1997-2012*



In high-income countries the affordability of beer in the median country, as measured by both the relative income price and minutes of labour, has remained relatively unchanged. However, the median low- and middle-income country has seen an increase in affordability in both measures, with a very rapid decline in the relative income price of beer, meaning beer has become rapidly more affordable, particularly in the 2000s. The decline in the minutes of labour for beer in the median low- and middle-income country has been less consistent, declining particularly between 2000 and 2006.

While beer has always been less affordable in South Africa than in the median high-income country, it has always been more affordable in than the median low- and middle-income country. Beer has become more affordable, over time, in South Africa and the gap in affordability between the medians, in both development groups, and South Africa, has declined substantially.

Figures 35 and 36 compare the trends in the affordability of wine using the relative income price and minutes of labour in South Africa compared to the median high-income and median low- and middle-income country in each year since 1990.

FIGURE 35: *AFFORDABILITY OF WINE (RELATIVE INCOME PRICE) IN SOUTH AFRICA, 1990-2012*

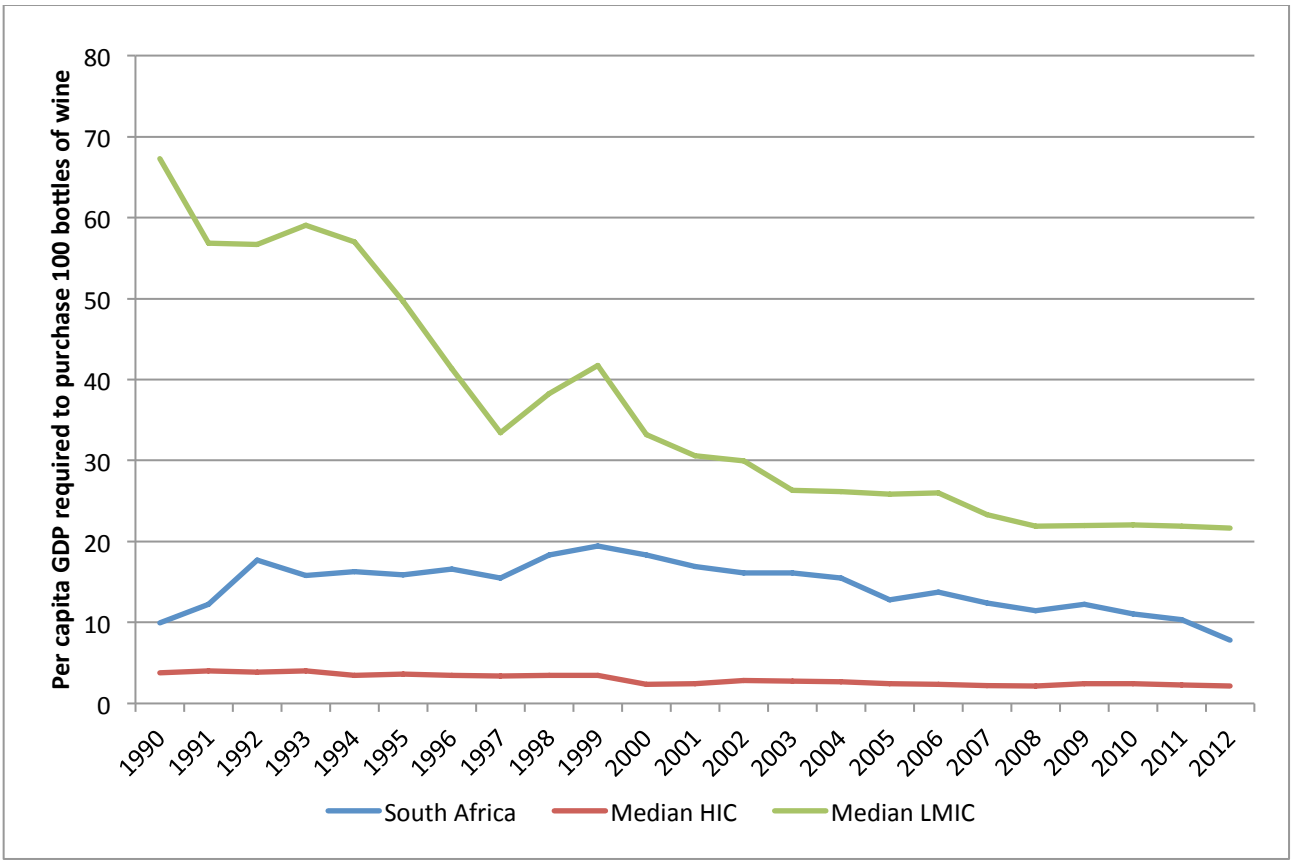
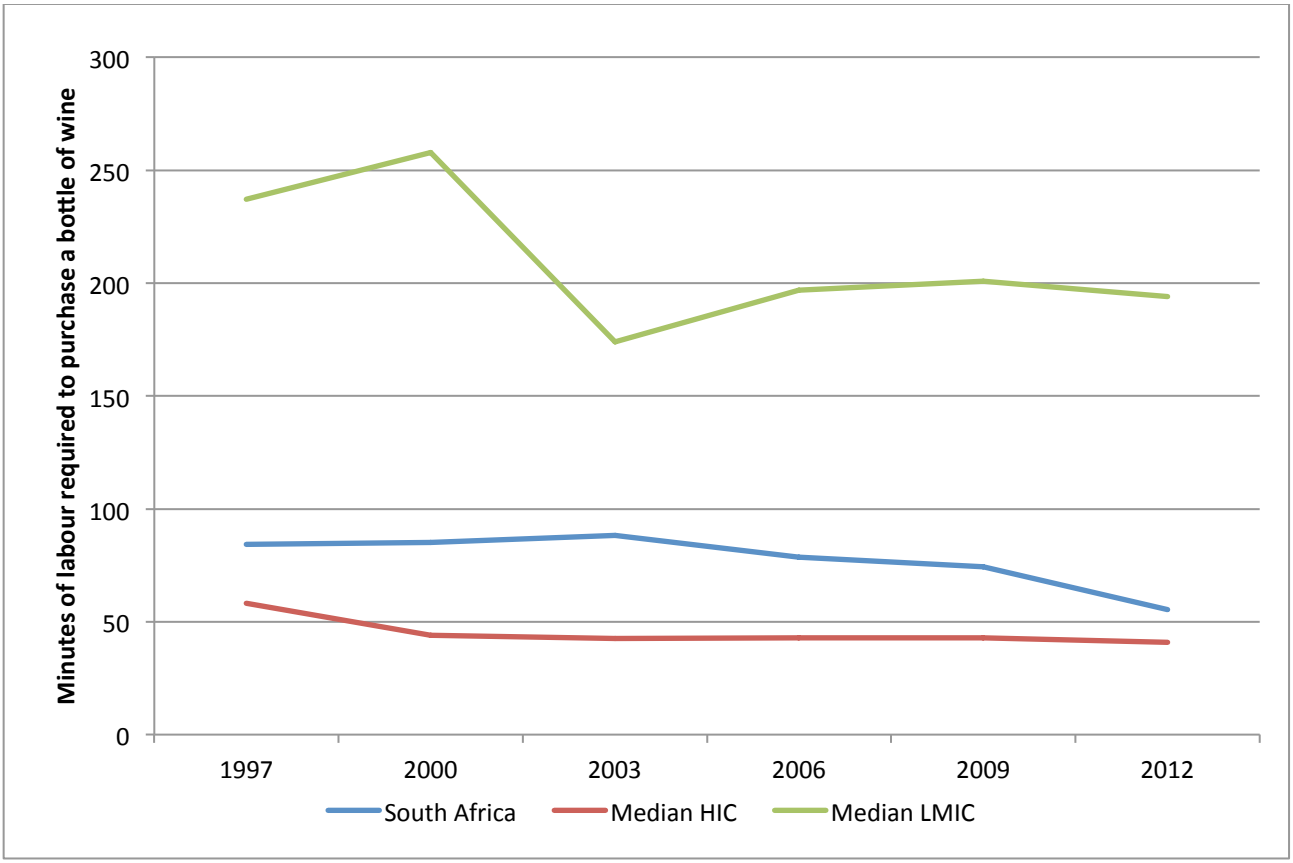


FIGURE 36: *AFFORDABILITY OF WINE (MINUTES OF LABOUR) IN SOUTH AFRICA, 1997-2012*



Wine has always been more affordable in South Africa than the median low- and middle-income country, but it has always been less affordable than the median high-income country. The relative income trend shows that wine has become more affordable since the late 1990s, reversing a trend of the previous decade where wine had become less affordable. This is consistent with the minutes of labour method which shows wine has become more affordable in South Africa since 1997. In other low- and middle-income countries wine has become more affordable far more rapidly than in South Africa. At the same time, wine became slightly more affordable in the median high-income country. The gap in affordability between South Africa and the median high- and low- and middle-income country has declined dramatically over this period and we see convergence in the relative income price. The minutes of labour method shows a similar trend although the convergence between the income groups has not been as dramatic. Both affordability measures show that the increase in affordability in the median low- and middle-income country has slowed dramatically in the later years.

Figures 37 and 38 compare the trends in the affordability of gin, using the relative income price and minutes of labour, in South Africa to the median high-income and median low- and middle-income country in each year since 1990.

FIGURE 37: *AFFORDABILITY OF GIN (RELATIVE INCOME PRICE) IN SOUTH AFRICA, 1990-2012*

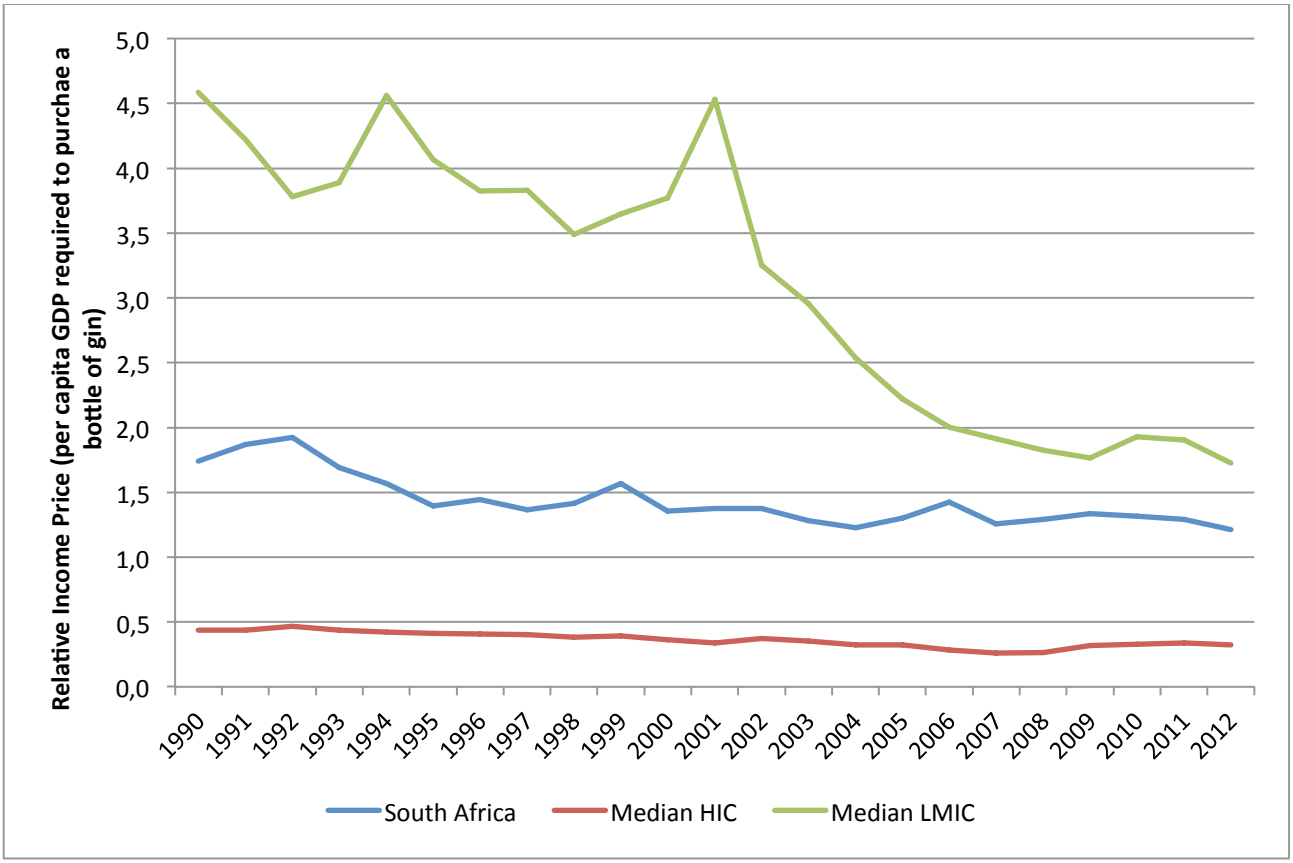
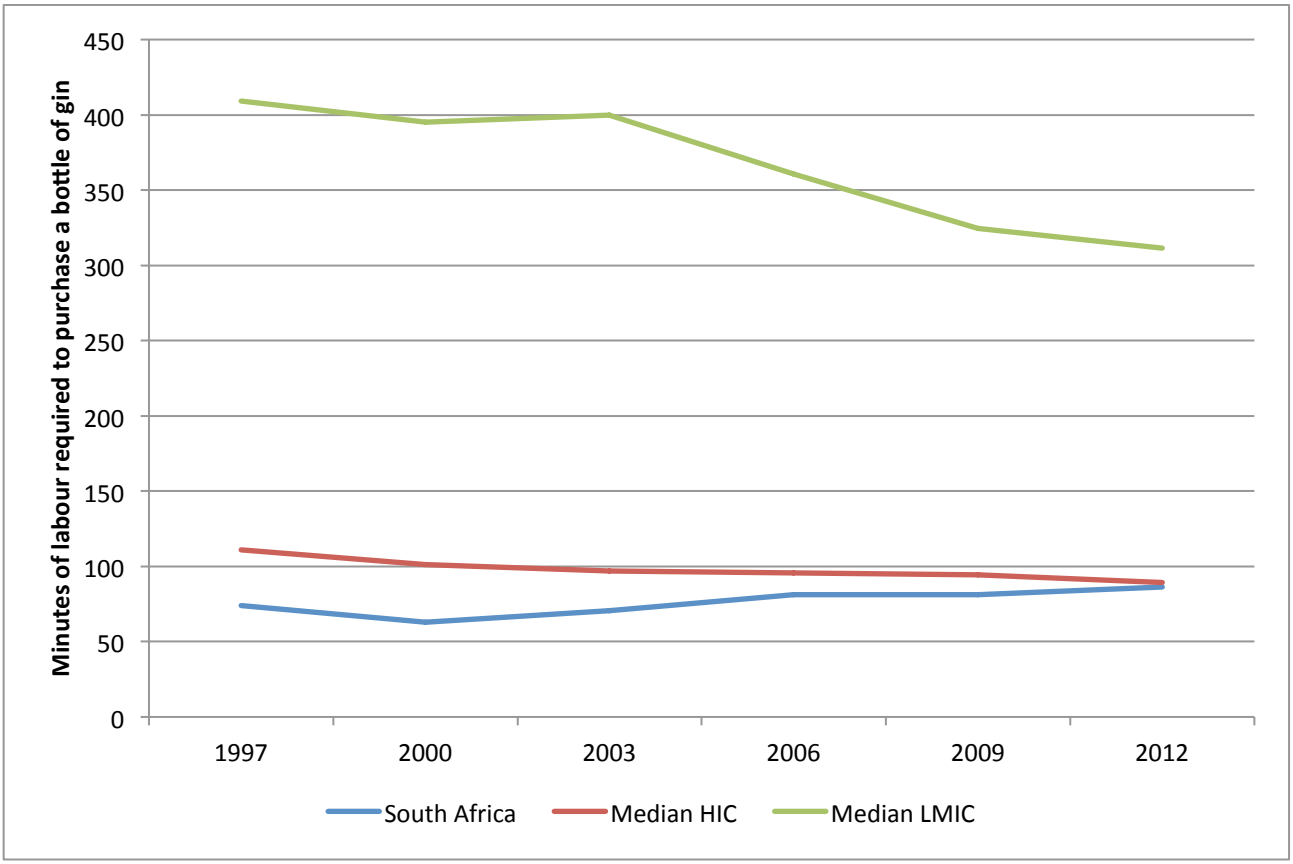


FIGURE 38: *AFFORDABILITY OF GIN (MINUTES OF LABOUR) IN SOUTH AFRICA, 1997-2012*



A different picture emerges for gin. A familiar pattern is seen for the relative income price, with South Africa between the median high-income country and the median low- and middle-income country, with a declining gap between them. The minutes of labour method shows South African gin being more affordable than the median high-income country. This is concerning from a policy perspective. It may be an artifact of different samples, or it might actually suggest that gin in South Africa is surprisingly very affordable by international standards. We suggest that this issue be investigated further.

The median high-income country is becoming slightly more affordable (based on the RIP), while gin in the median low- and middle-income country has become more affordable very rapidly, particularly in the 2000s. Gin has become more affordable in South Africa relatively consistently since 1990.

Figures 39 and 40 compare the trends in the affordability of whisky, using the relative income price and minutes of labour, in South Africa to the median high-income and median low- and middle-income country in each year since 1990.

FIGURE 39: *AFFORDABILITY OF WHISKY (RELATIVE INCOME PRICE) IN SOUTH AFRICA, 1990-2012*

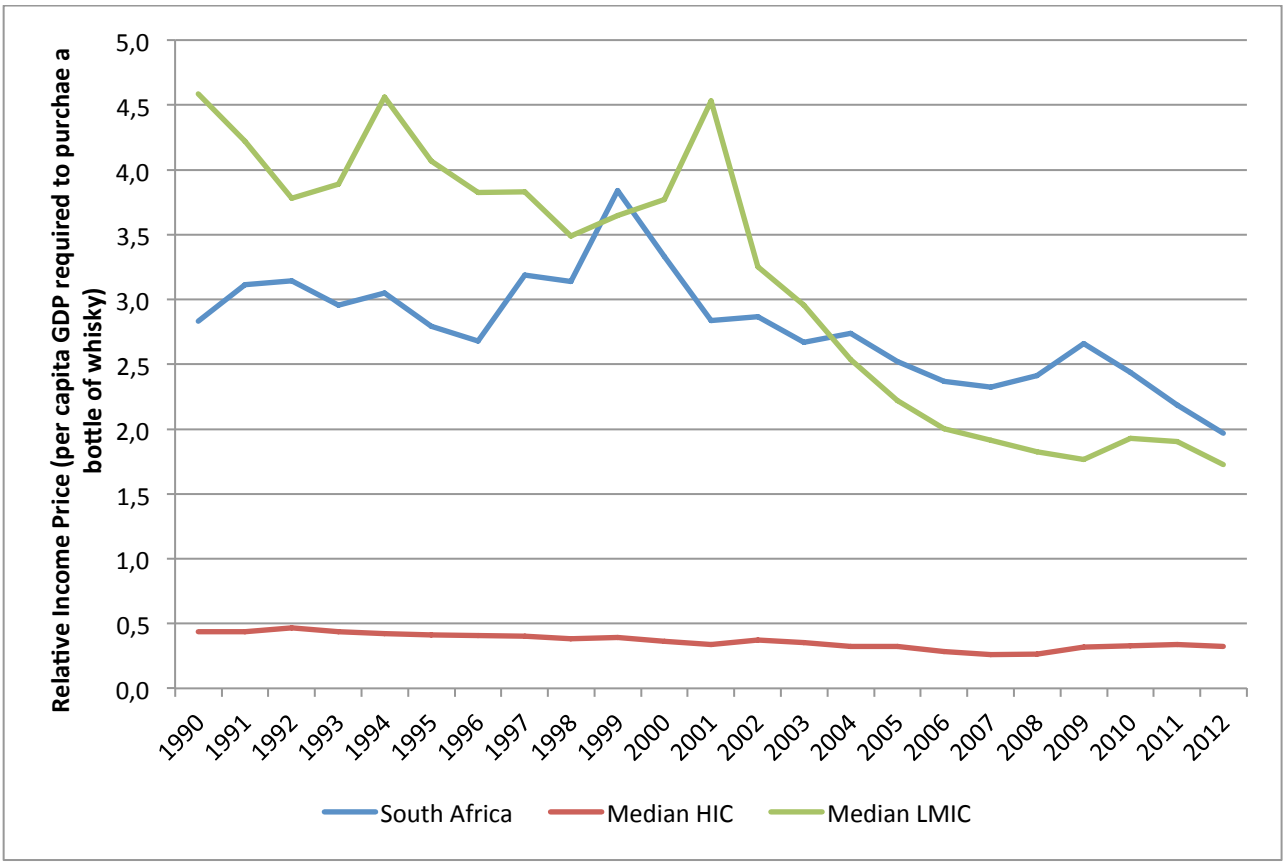
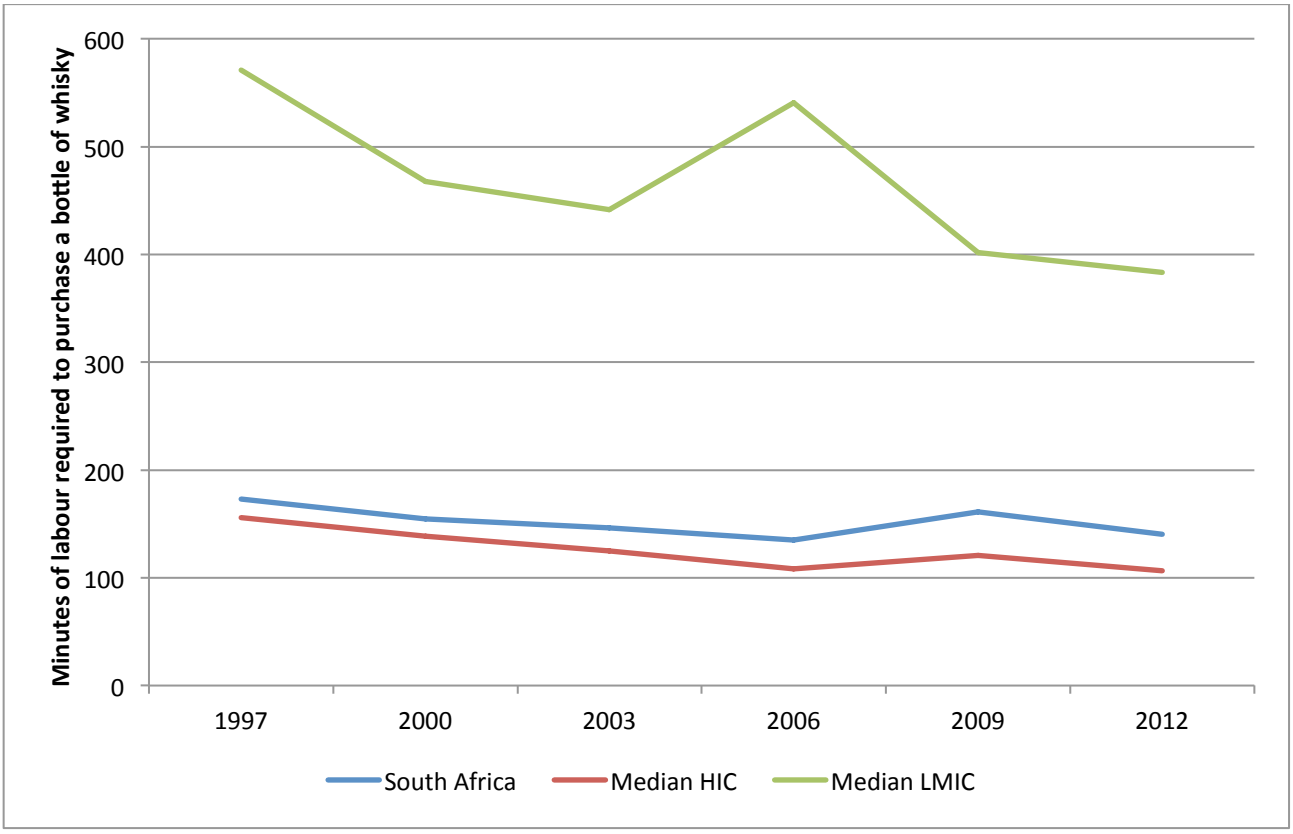


FIGURE 40: *AFFORDABILITY OF WHISKY (MINUTES OF LABOUR) IN SOUTH AFRICA, 1997-2012*



Whisky also shows a different and to some extent unexpected trend. While whisky initially became less affordable in South Africa in the late 1990s (as measured by the relative income price) it has, in the 2000s, become more affordable using both affordability measures, especially so when measured by the relative income price. Whisky has also become rapidly more affordable in the median low- and middle-income country group, particularly when measured by the relative income price. The interesting observation here is that whisky is not consistently more affordable in South Africa than the median low- and middle-income country, and in the most recent years is less affordable.

What is clear from these figures is that alcohol products have become more affordable over time on a global basis. The trend in South Africa has also seen alcohol products become more affordable. In addition, the gap between the rich and poor countries is declining, with affordability measures converging. This is to be expected, since income levels in low- and middle-income countries are rising at significantly more rapid rates than incomes in high-income countries. At the same time, real prices are declining in many countries, meaning that there is no price offset to maintain or reduce the affordability of alcohol products. While affordability in South Africa is rising, it is not rising at the same pace as in many other low- and middle-income countries. Although this might be an encouraging conclusion within a comparative context, it is clear that tax and price policies in South Africa have not been focused on reducing consumption. One should especially consider trends in affordability since it is changes in affordability over time that influence consumption patterns.

Cigarettes are useful as a base of comparison. Cigarette smoking causes negative externalities in a similar manner to alcohol, i.e. to both users and non-users. As a result, both products are often the subject of excise taxes to compensate the fiscus for the costs associated with the use of the products as well as to discourage use. In South Africa, both alcohol and cigarettes are subject to excise taxes. Figure 41 shows the trends in affordability of the three categories of alcohol considered as well as that of cigarettes. The trends

are different in direction and magnitude. While all alcohol products have become more affordable in South Africa since 1990, cigarettes have become considerably less affordable. This decline in affordability has been the result of a deliberate excise tax policy to reduce use. Furthermore, the most considerable declines in the affordability of cigarettes occurred in the late 1990s. During this same period wine and beer saw no significant change in affordability, while gin saw an increase in affordability. This indicates that the decline in affordability was driven by price increases rather than by changes in incomes.

FIGURE 41: *AFFORDABILITY OF BEER, WINE, SPIRITS AND CIGARETTES (RELATIVE INCOME PRICE) IN SOUTH AFRICA, 1990-2012*

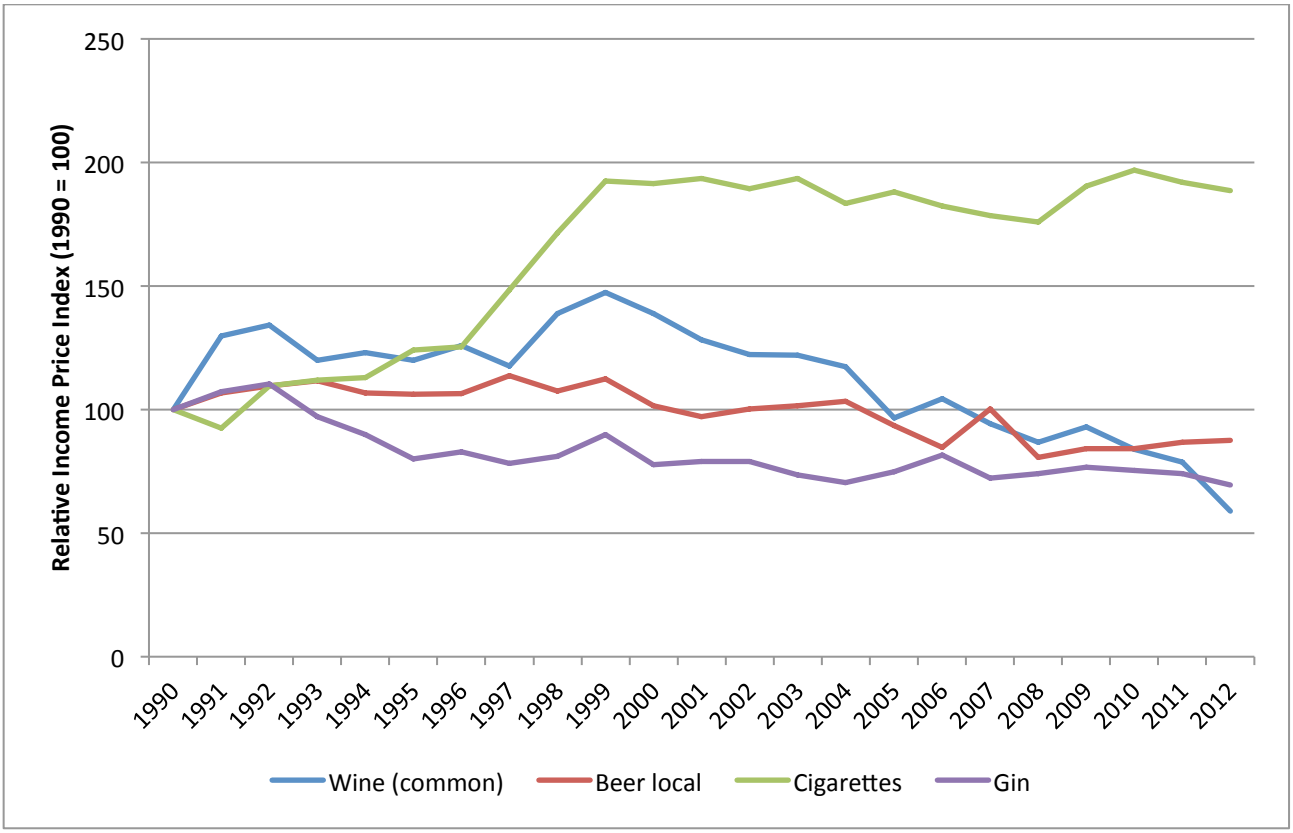


Figure 41 describes trends in the affordability of alcohol products in South Africa using the EIU price data and is thus constrained to offer a view from 1990 onwards. The EIU data provide a reasonably accurate cross-country view but are unable to show trends during earlier periods in South Africa when taxes and prices declined considerably in real terms.

Using locally sourced price data, we are able to establish longer views of the affordability of some alcohol products in South Africa. We use two sources of data: (1) highly disaggregated alcohol price data used by Statistics South Africa (SSA) in the compilation of the consumer price index for the period 2001-2013 onwards, and (2) older annual price data obtained from SSA's Yearbook on Prices. We were able to do this for beer and brandy only since definitional differences between the two series make this comparison impossible for other alcohol products.

Figures 42 and 43 show the long-term trends in alcohol affordability, as measured by the relative income price in South Africa from 1970 to 2012 for beer and brandy, respectively. The data are standardized to fit the EIU data and previous definitions of product size and affordability used in this chapter. We have superimposed the EIU affordability series on to the SSA data for comparison. Since no EIU series is available for brandy, we have used gin as a proxy, as gin and brandy show a very high correlation in the historical SSA report on prices.

FIGURE 42: *LONG TERMS TRENDS IN THE AFFORDABILITY OF BEER IN SOUTH AFRICA*

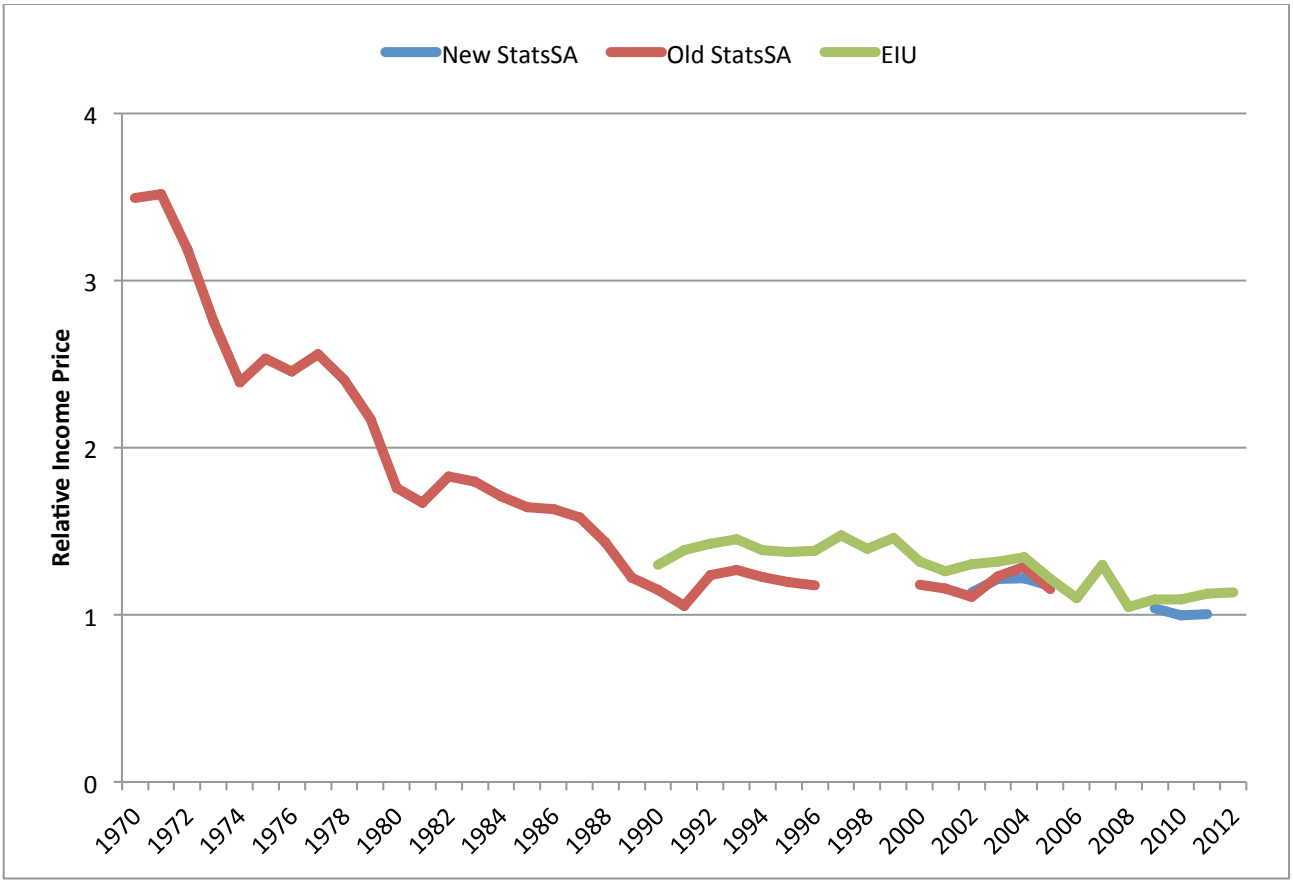
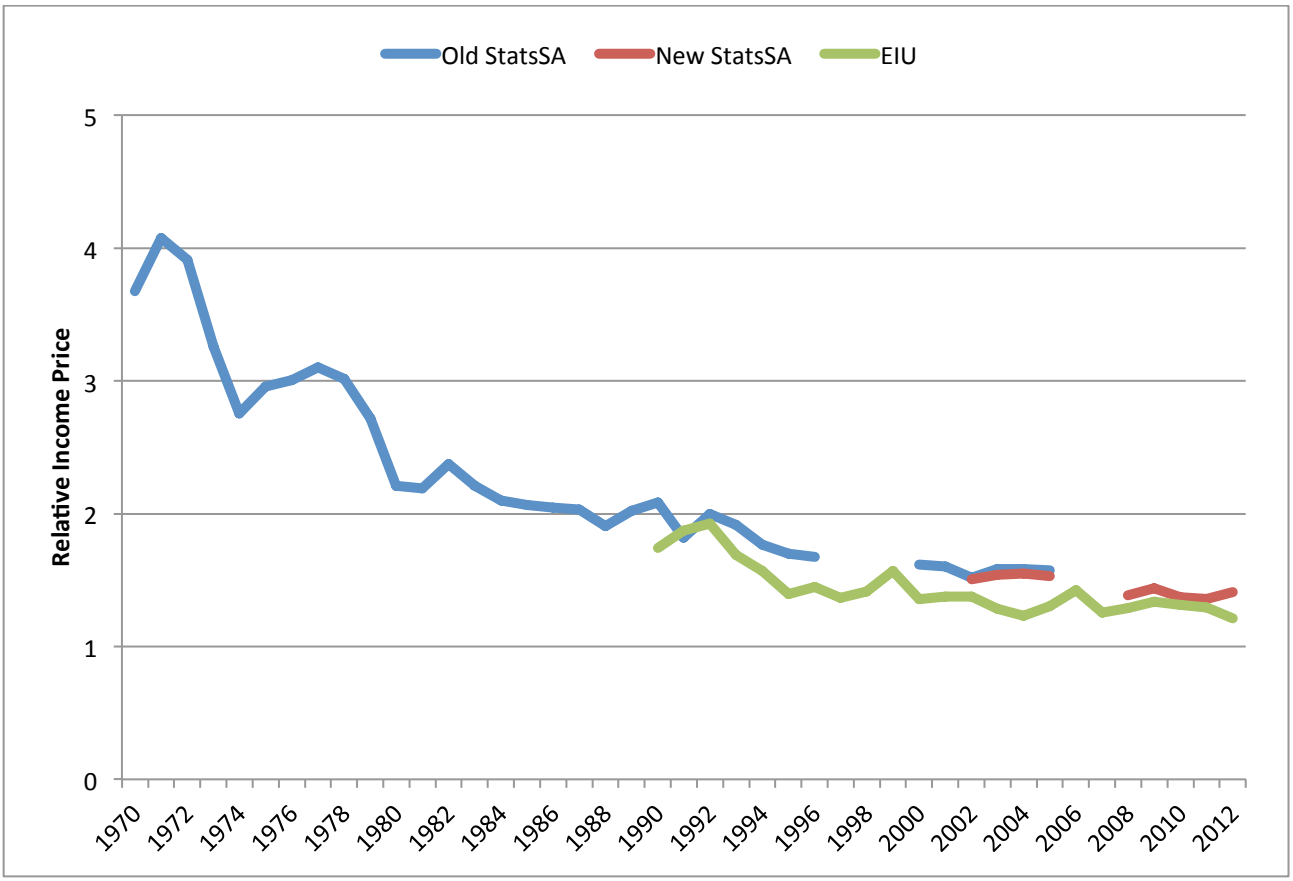


FIGURE 43: *LONG TERM TRENDS IN THE AFFORDABILITY OF BRANDY (GIN) IN SOUTH AFRICA*



While Figure 41 showed that alcohol products had become more affordable since the 1990s, this increase in affordability was small in comparison to the increases in affordability experiences in the 1970s and 1980s. During these two decades the relative income price halved for both beer and brandy, mostly as a result of real decreases in excise taxes and prices. The fact that alcohol products became much more affordable during the 1970s and 1980s offers an important lesson for tax and price policies in the future, namely that tax and price policy should incorporate trends in incomes to ensure that alcohol products do not become more affordable over time.

4. DISCUSSION AND CONCLUSION

Studying the affordability of alcohol products is an important analysis when considering the demand for alcohol products. While increases in taxes and prices can themselves result in reductions in the demand for alcohol products they are not a necessary condition. If increases in incomes are of a similar or greater magnitude than the increases in taxes and prices demand may not decline, since the increase in income can counter the increases in prices. The simultaneous analysis of both price and income allows a formal assessment of the affordability of alcohol products. This analysis may take the form of measuring and analyzing contemporary affordability by comparing one country to another, or measuring and analyzing inter-temporal trends in individual countries or groups of countries over time.

This chapter has developed techniques for measuring the affordability of four alcohol products (beer, wine, gin and whisky). Borrowing from the significant cigarette affordability literature we develop two methods, the relative income price and the minutes of labour required to purchase alcohol. Using the same price data, these two methods use different income data to measure affordability. The relative income price uses a broad income measure and measures an annual time series, while the minutes of labour method uses a narrower measure of income, measuring a discrete time series with observations every three years. As discussed, the two measures have different strengths and weaknesses and are suited to different circumstances. Earlier literature (see Blecher and Van Walbeek 2009) have shown that the difference in choice of measure is more meaningful in low- and middle-income countries where the correlation between the measures is less. This is probably because the UBS wage data that is used includes mostly professional jobs which are more likely, the poorer the country is, to represent a range of higher income earners. Nevertheless, the trends are clear: alcohol products have become more affordable in most countries in the world since 1990, and the increase in affordability was particularly dramatic in low- and middle-income countries after 2000 as income growth began to increase more dramatically. This result is considerably different from what has been experienced with cigarettes, where a dichotomous conclusion has been reached. In cigarettes, affordability increased in the low- and middle-income countries but affordability has been declining in the high-income countries as more governments took deliberate action by raising taxes to increase the price of cigarettes. Increases in tobacco taxes have not translated into or been combined with increases in alcohol taxers, even in high-income countries.

Affordability trends in South Africa are consistent with those seen in other countries, with alcohol products becoming more affordable over time. In addition to this, alcohol products in South Africa are more affordable than in most low- and middle-income countries and at times more affordable than in some high-income countries. By one measure, some alcohol products are more affordable in South Africa than in any other low- and middle-income country. This might help to explain the very high levels of alcohol use and possibly even the high levels of alcohol misuse experienced in South Africa. Furthermore, this is an expected result given the trends in taxes and prices explained in earlier chapters and builds the case for specific policy interventions which may result in higher prices and reduce the affordability of alcohol products in the future in South Africa.

REFERENCES

Blecher, E.H. & van Walbeek, C.P., 2004. An international analysis of cigarette affordability. *Tobacco Control*, 13, 339-346.

Blecher, E.H. & van Walbeek, C.P., 2009. Cigarette affordability trends: an update and some methodological comments. *Tobacco Control*, 18, 167-175.

Economist Intelligence Unit, 1990. *Worldwide cost of living survey*. [online] Available at: http://store.eiu.com/product/130000213.html

Eriksen, M., Mackay, J., Ross, H., 2012. *The Tobacco Atlas*. 4th ed. Atlanta: American Cancer Society.

Guindon, G., Tobin, S. & Yach, D., 2002. Trends and affordability of cigarette prices: ample room for tax increases and related health gains. *Tobacco Control*, 11, 35-43.

Gujarati, D., 2003. *Basic Econometrics*. 4th ed., New York: McGraw-Hill.

Kan, M., 2007. Investigating cigarette affordability in 60 cities using the cigarette price-daily income ratio. *Tobacco Control*, 16, 429-432.

Kan, M., Lau, M., 2013. Comparing alcohol affordability in 65 cities worldwide. *Drug and Alcohol Review*, 32, 19-26.

Lal, A. & Scollo, M., 2002. Big Mac index of cigarette affordability. *Tobacco Control*, 11, 280-2.

Mackay, J., Eriksen, M. & Shafey, O., 2006. *The Tobacco Atlas.* 2nd ed. Atlanta: American Cancer Society.

Scollo, M. & Lal, A., 1996. The Big Mac index of cigarette affordability. *Tobacco Control*, 5, 69-70.

Union Bank of Switzerland, *Prices and Earnings: A comparison of purchasing power around the globe.* [online] Available at: http://www.ubs.com/1/e/ubs_ch/wealth_mgmt_ch/research.html

World Bank, World Development Indicators. Available at: http://data.worldbank.org/indicator

World Health Organization, 1998. *Guidelines for controlling and monitoring the tobacco epidemic*. Geneva: World Health Organization.

THE ECONOMICS OF ALCOHOL POLICY IN SOUTH AFRICA

CHAPTER 7

Literature Review on Estimating Price and Income Elasticities for Alcohol

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LITERATURE REVIEW ON ESTIMATING PRICE AND INCOME ELASTICITIES FOR ALCOHOL

1. INTRODUCTION

One of the fundamental concepts in economics is the law of demand, which states that as the price of the product increases, the quantity demanded of that product decreases, and vice versa. Other factors, such as income, the price of substitute or complementary products, and product-specific factors also influence the quantity demanded, but it is generally held that the price of the product is the single greatest determinant.

The price elasticity of demand indicates how sensitive consumption is to changes in price. If the price of a product increases by, for example, 10% and the quantity consumed decreases by 1%, then that product still obeys the law of demand, but consumption's responsiveness to a change in price is low. In economic jargon the product is said to be price inelastic. On the other hand, if the price of a product increases by 10% and the quantity consumed decreases by 20%, then this would be a relatively large response. The product is said to be price elastic, i.e. highly responsive to changes in the price of the product.

There was a time when people argued that addictive products would not follow the law of demand (see references in Chaloupka and Warner, 1999). The argument went that a price increase would not reduce consumption because addicted people would want (or have) to buy the product, despite its high price. If this is the case, the product is perfectly price inelastic, and would thus have a price elasticity of zero.

Alcohol is addictive to some people, but certainly not for all, so it would not fit this profile, not even in principle. Tobacco, on the other hand, is addictive for most people who consume it, and would thus be a good example to test whether the price elasticity is zero.

In the following paragraph we will briefly describe how an understanding of the determinants of demand for tobacco, and especially the impact that price increases have had on tobacco demand, can inform the alcohol story. There are significant overlaps between tobacco and alcohol, and lessons learnt and experiences gained from tobacco should inform alcohol policy. This is especially relevant for excise tax policy, because (1) excise tax policy on alcohol is one of the focus areas of this report and (2) excise tax policy on tobacco has been particularly successful in reducing tobacco use.

Hundreds of empirical studies have been performed on the demand for tobacco in the past 50 years and the results have been extraordinarily consistent, namely that cigarette consumption (and tobacco consumption generally) does respond to changes in the price of the product (IARC, 2011). In fact, there is a broad consensus that the price elasticity of the demand for cigarettes is centred around -0.4 in high income countries and is generally somewhat higher (in absolute terms) for low- and middle-income countries. This implies that for every 10% increase in the price of cigarettes, one can expect cigarette consumption to decrease by 4% in a typical high-income country and by a slightly greater percentage in a typical low- and middle-income country.

An understanding of the magnitude of the price elasticity of demand is vital for any firm that produces a product or any other organisation or body that has an interest in knowing how much of that commodity is being consumed. The tobacco industry has a strong interest in knowing how consumers respond to a change in the price of cigarettes. In fact, evidence from South Africa and elsewhere indicates that they have

used this information to inform their pricing strategy and they have been able to increase their profitability substantially, despite decreasing consumption because of increasing taxes and other legislative interventions (Van Walbeek, 2004).

The government also has a significant interest in knowing the price elasticity of demand for tobacco. In 1994, as part of its primary health care focus, the government announced that it would sharply increase the excise tax on tobacco products. The government worked on the premise that an increase in the excise tax would increase the retail price, which in turn would make cigarettes less affordable and would result in some people quitting smoking and others not taking up the habit.

With the benefit of hindsight, the government's policy intervention has been extremely successful. In aggregate terms cigarette consumption decreased by about a third and in per capita terms by half within the space of 10 years (Van Walbeek, 2005). Smoking prevalence amongst adults decreased from about 33% in 1993 to just over 20% in 2012 (SANHANES, 2013, NIDS, 2013).

These large reductions in smoking prevalence and the quantity of cigarettes consumed are attributed primarily to increases in the price of cigarettes. Legislative changes, such as the banning of tobacco advertising and the introduction of smoke-free air policies, certainly had an impact, but the main factor that reduced cigarette consumption in South Africa was the increase in the retail price of cigarettes (Van Walbeek, 2005). In fact, it is generally acknowledged that an increase in the excise tax, which increases the retail price of cigarettes, is the single most effective tool to reduce cigarette consumption (WHO, 2010, IARC, 2011).

Within this context, the focus in this and the subsequent chapter is on the demand for alcohol, and specifically the impact that changes in alcohol prices would be expected to have on alcohol consumption. The current chapter considers the existing empirical literature; the subsequent chapter uses a relatively new set of data to estimate the price elasticity of demand for alcohol in South Africa.

2. EMPIRICAL STRATEGIES

2.1 TIME SERIES, CROSS-SECTIONAL AND LONGITUDINAL DATA

Until the 1980s empirical analyses were very crude, given the lack of computing power. Studies that aimed to estimate the price and income elasticities of products typically used time series data. Consumption of a product would be specified as a function of the price, income and some product-specific factors. If all the variables are specified in logarithmic terms, the coefficients are then the appropriate elasticities. If some other mathematical form was used, one would typically have to do some minor calculations to determine the elasticities.

In the past two decades analyses based on time series data have become less common and there has been a much stronger focus on cross-sectional and even longitudinal (or panel) studies. Longitudinal studies are cross-sectional surveys, where the same individuals or households are surveyed in consecutive waves of the survey.

The relative decline of time-series based studies can be attributed to a number of reasons. The first is that time series data allow the researcher to answer only a limited number of questions. For example, within the alcohol context, one can estimate price, income and even cross-price elasticities of demand for

different categories of alcohol and for alcohol as a whole, and possibly the impact of policy (e.g. the imposition of an advertising ban). Of course, these elasticities are very useful, both to the industry and to the government. Unfortunately time series data do not allow one to establish, for example, how different demographic or socio-economic groups are affected by a change in price. The aggregate nature of the data simply does not allow one to do this. Also, time series data do not allow one to determine whether the decrease in overall alcohol consumption is because fewer people drink alcohol, or whether people drink less alcohol per drinker on average.

The second reason for the relative decline in time-series based studies is because time series data have numerous problems associated with them. Some of these problems can be addressed by employing an appropriate econometric technique, while others cannot really be satisfactorily addressed. For example, a practical issue is a high degree of collinearity between the explanatory variables. This results in unstable parameter estimates and high standard errors (and thus large confidence intervals). There is not much that researchers can do about this. The "solutions" (e.g. dropping a highly collinear variable) often result in other problems. Autocorrelation (i.e. correlation of consecutive error terms) is very common in time series data analysis and tends to bias the standard errors of the coefficients towards zero. As another example of inherent problems with time series data, until the late 1980s many researchers were aware of the possibility of spurious regression, which one gets when two unrelated but non-stationary (i.e. trending) variables are regressed on one another and the statistical results are quite impressive, even though there is no economic or logical explanation for any relationship. Even though researchers were aware of this, they largely ignored it. Techniques pioneered by Engle and Granger (1987), Johansen (1995) and others explicitly addressed the issue of spurious regression, and currently most time series analyses explicitly test for stationarity in the data, and for cointegration of the relationship.

The third reason for the move away from time-series based studies is that, with aggregate data, the price of the product and the quantity consumed are jointly determined. Consumers of alcohol base their consumption on the price of alcohol, but the price is also determined by the quantity consumed. To assume that the price of alcohol is completely exogenously determined is simply not correct. The result is endogeneity in the regression equation, which implies that the coefficients that are estimated are not as good and believable as one would expect.

Cross-sectional data have distinct advantages over time-series data, but also distinct disadvantages. The main advantage, from the perspective of this report, is that cross-sectional data allow one to estimate the impact of the determinants of demand for alcohol on different demographic and socio-economic groups. In this report the focus is on price, but the same principle applies to all other determinants of consumption. One can answer a variety of questions, e.g. are poor people more price responsive than better-off or affluent people? Are heavy drinkers more or less price responsive than moderate or light drinkers? If people do not drink at all, is it because they cannot afford it or because they choose not to drink? If alcohol consumption decreases, what proportion of that decrease can be ascribed to people quitting alcohol altogether (or not starting to drink), and what proportion of the decrease is ascribed to continuing drinkers who simply cut down their consumption of alcohol? Depending on the sophistication of the data (e.g. whether it is a single cross-section or a panel) and the sophistication of the econometric techniques employed, these questions can be answered.

Another advantage of using cross-sectional data is that the problem that consumption and the price are jointly determined (which is a major concern in time-series analyses) falls away. From the perspective of an

individual the price of alcohol is exogenously determined. Because an individual is only one of hundreds of thousands, or even millions, of consumers, his or her purchasing actions have no impact on the price, but the price certainly has a significant impact on his or her decision to buy the product or not, and on how much to buy.

However, there is a potential problem with regard to the price that is reported or imputed in cross-sectional studies. In expenditure surveys, the price is often not explicitly asked, but is imputed by dividing the total expenditure on that product by the total consumption (at either the individual or household level). The "price" that is obtained (which is more usually called the "unit value" in this literature) reflects both the relative scarcity of the product but also the quality of the product. Richer individuals and households typically buy higher quality products than poorer individuals or households. As will be shown in the next chapter, there are ways in which one can adjust for this, but it should be addressed explicitly.

The disadvantage of using traditional cross-sectional data (i.e. not longitudinal data) is that there are no dynamic effects. Since the dataset is a "snapshot", one cannot determine how people respond to changes over time. For example, one would ideally want to know how people change their consumption patterns in response to a *change* in income or a *change* in prices. With cross-sectional data, one is forced to make the rather heroic assumption that people will display the same behaviour as people whose attributes they may get one day but who are currently different to them. For example, if older people have different consumption patterns and responses to, say, price increases, than young people, we implicitly assume that the current cohort of young people will behave like the current cohort of older people, once they become older. As another example, if poor people have different consumption patterns than affluent people, we implicitly assume that poor people will adopt the same consumption patterns as the current group of affluent people, should some members of the currently poor cohort become affluent.

In order to address some of the concerns associated with cross-sectional data, there has been an explosion in the number of longitudinal studies in the past two decades. These are expensive studies because they entail following up the same sample of individuals or households in subsequent waves. Longitudinal studies have been performed for many years in the US (e.g. Monitoring the Future surveys), but have become popular in South Africa in recent years. For example, the Birth to Twenty cohort study, run from Wits University, and the Cape Area Panel Study (CAPS) have had a number of waves. Following up from the KwaZulu-Natal Income Dynamics Study (KIDS), the National Income Dynamics Study (NIDS) was launched in 2007 and surveyed its first wave of participants in 2008.

Longitudinal surveys allow one to ask questions that previously were not possible. However, they do require one to make a very substantial investment for many years.

2.2 ESTIMATION TECHNIQUES USING CROSS-SECTIONAL DATA

The relative magnitude of the prevalence elasticity vis-à-vis the intensity elasticity varies substantially, depending on research design, the realities in a country, the definition of "not consuming" and the econometric techniques used. This section will describe how different approaches can provide you with different results for the elasticity of demand, and how the Almost Ideal Demand System presents the best option in looking into cross-subsidization of various alcohol products.

Studies that have investigated the demand for cigarettes, and to a lesser extent those that have investigated the demand for alcohol, often work from the premise that the (potential) consumer faces two

decisions. The first decision is whether he or she wants to buy the product or not. If he or she decides not to buy the product this could be for one of two reasons: (1) the product is too expensive, relative to his or her spending power (this is what economists call a corner solution), or (2) the person simply does not want to buy the product (e.g. the person dislikes cigarette smoking or the person's religious beliefs dictate that he or she should not drink alcohol). If the person does decide to buy the product, the next step is to determine how much he or she wants to buy.

Econometrically this is often presented as a two-step process. In the first step a logit or probit model is specified to determine the prevalence of the activity. Logit or probit models are usually used because the (potential) consumer faces a dichotomous decision: should I buy the product or not? Factors that will influence that decision are the characteristics of the person (e.g. demographics, socio-economic variables, religious beliefs, societal variables, and the price of the product). The decisions of these individuals collectively determine the prevalence of the activity.

Within the context of this report the price is particularly important in this initial decision. One would expect that an increase in the price of alcohol would persuade some current consumers of alcohol to quit drinking completely, and some people who are considering starting to consume alcohol not to start. The metric that summarises the percentage of people affected in this way is called the price elasticity of alcohol prevalence.

Consider the following numerical example. If the percentage of drinkers decreases from 50% to 49% of the adult population in response to a 10% increase in the price of alcohol, the price elasticity of alcohol prevalence would be -0.2, calculated as 2% (because the decrease from 50% to 49% is a 2% decrease, even though it is a 1 *percentage point* decrease), divided by the 10% price increase.

Once the determinants of prevalence have been identified and their impact measured by means of a logit or probit model, the next step in the analysis considers only those people who have decided to buy the product. The relevant question for them is: how much do I want to buy, given my personal and socio-economic characteristics, and the price of the product? This is the conditional demand. It is conditional because it depends on the initial decision about whether the person wants to buy the product or not. Typically this conditional demand equation is estimated with OLS method, where the (non-zero) demand is regressed against a number of demographic and socio-economic variables and the price. One would expect the continuing user to reduce his or her consumption on average if faced with higher prices. The resulting elasticity is called the conditional demand elasticity or the price elasticity of alcohol intensity, as the case may be. Thus, taking the example in the previous paragraph further, should average alcohol consumption among the remaining 49% of the adult population that continues using alcohol reduce from 6.0 litres absolute alcohol per year to 5.7 litres per year in response to the 10% increase in the price of alcohol, the conditional price elasticity of demand for alcohol (or the price elasticity of alcohol intensity) would be -0.5, calculated as the 5% decrease in average alcohol consumption among remaining consumers, divided by the 10% increase in the price.

The total price elasticity of demand is simply the sum of the prevalence and the intensity elasticity of demand. In this example it would be -0.7, which implies that a 10% increase in the price will reduce consumption by 7%.

Demand studies based on cross-sectional data for alcohol are typically more complicated than demand studies for cigarettes. Other than roll-your-own cigarettes, manufactured cigarettes have very few substitutes and thus it would make sense to look at cigarettes on their own. However, any category of

alcohol has a number of substitutes. The three most common alcohol categories are beer, spirits and wine, and each one has multiple sub-categories. One cannot look at the demand for beer in isolation from the demand for wine and spirits. Similarly, one cannot look at the demand for wine in isolation from the demand for beer and spirits. Should the price of beer change, while the prices of wine and spirits remain constant, this would have an impact on the consumption of both wine and beer.

The cross-price elasticity of demand measures the strength of the relationship between the price of one product and the quantity demanded of another. The cross-price elasticity is defined as the percentage change in the quantity demanded of product X, divided by the percentage change in the price of product Y. Should the cross-price elasticity be negative, it implies that the quantity demanded of product X decreases when product Y becomes more expensive. The two products are thus complements. On the other hand, should the cross-price elasticity be positive, the two products are substitutes. A priori, it is not obvious that the various alcohol categories are substitutes or complements of each other. One could argue it either way. For that reason one should empirically test the relationship.

In order to account for these interactions between the various alcohol categories, the demand for alcohol is typically modelled as a system. Of course, this can only be done where one has price and consumption data for the various categories (or even sub-categories, such as whisky, brandy and rum within the category of spirits). Should one only have data for “alcohol”, and all categories of alcohol are lumped together, then this matter is academic, even though one could estimate “average” price and income elasticities for alcohol as a group.

A number of demand systems have been developed over the years, but the Almost Ideal Demand System, initially presented by Deaton and Muellbauer (1980), has gained the most popularity. This model is superior in terms of its theoretical underpinning to the Rotterdam model (Theil, 1965, 1976) and the translog model (Jorgenson, 1975). In recent years this model has been generalised by Banks et al. (1997), allowing the relationship between the consumption share of the products in question and some of the explanatory variables to vary over different values of those explanatory variables. While the technical details of these various models will not be repeated here, it is useful briefly to provide an intuitive discussion of what these demand systems aim to do.

A consumer faces a budget constraint. Within this budget constraint he or he wishes to purchase goods and services that maximise his or her utility. The purchase of an additional unit of product X implies that the consumer has to give up another good, or a range of other goods. A change in the price of product X not only affects the quantity demanded of product X, but, through both the income and substitution effects, the quantities of all goods and services in the consumer’s basket.

The demand for each product in the consumer’s basket is determined by his or her characteristics, his or her income, the price of each product and the prices of all other products. An increase in income would increase the quantity demanded of product X by a certain percentage but would increase (or even decrease, if it is an inferior product) the quantity demanded of product Y. In other words, the income elasticities can vary across products. The Quadratic Almost Ideal Demand System model of Banks et al. (1997) allows for changing income elasticities. Thus, as a person’s income increases, the income elasticity of a product can change, e.g. a product may be a luxury at very low levels of income, become a normal good as income levels increase and become an inferior good at high levels of income.

3. PREVALENCE STUDIES ESTIMATING THE DEMAND FOR ALCOHOL

We did a thorough search for previous studies that estimated the demand for alcohol. A list of these studies is shown in the Appendix. For each study, the country of analysis, the period of study, the technique used, and the price, income and cross-price elasticities are shown. For example, for Australia most of the studies have been performed by Clements, Selvanathan and colleagues, using time-series data, but within the context of a demand system. The price elasticities vary, depending on the time period covered in the study and the technique used. The price elasticities are all negative, as is to be expected and are, with two exceptions, less than one in absolute terms. We can conclude that beer, wine and spirits in Australia are relatively price inelastic. Between the three categories of alcohol, beer seems to be the least price elastic, followed by wine and then spirits.
As for the income elasticities in Australia, they are all positive, indicating that alcohol is a normal product. This is to be expected a priori. For beer and wine the income elasticities are clustered in the range 0.6 to 1.0, while for spirits the income elasticity estimates are clustered around 2. On the basis of these income elasticities beer and wine would be classified as “necessities”, while spirits would be classified as a luxury.

The cross-price elasticities for alcoholic beverages in Australia are typically much smaller in absolute terms than the own-price elasticities. This implies that the consumption of a category (say beer) is determined much more by changes in its own price than changes in the price of another category (say wine or spirits). Again, this makes intuitive sense.

For Australia most of the cross-price elasticities are positive, which means that the alcohol categories are substitutes of each other. Thus an increase in the price of beer, for example, would be expected to increase the consumption of both wine and spirits.

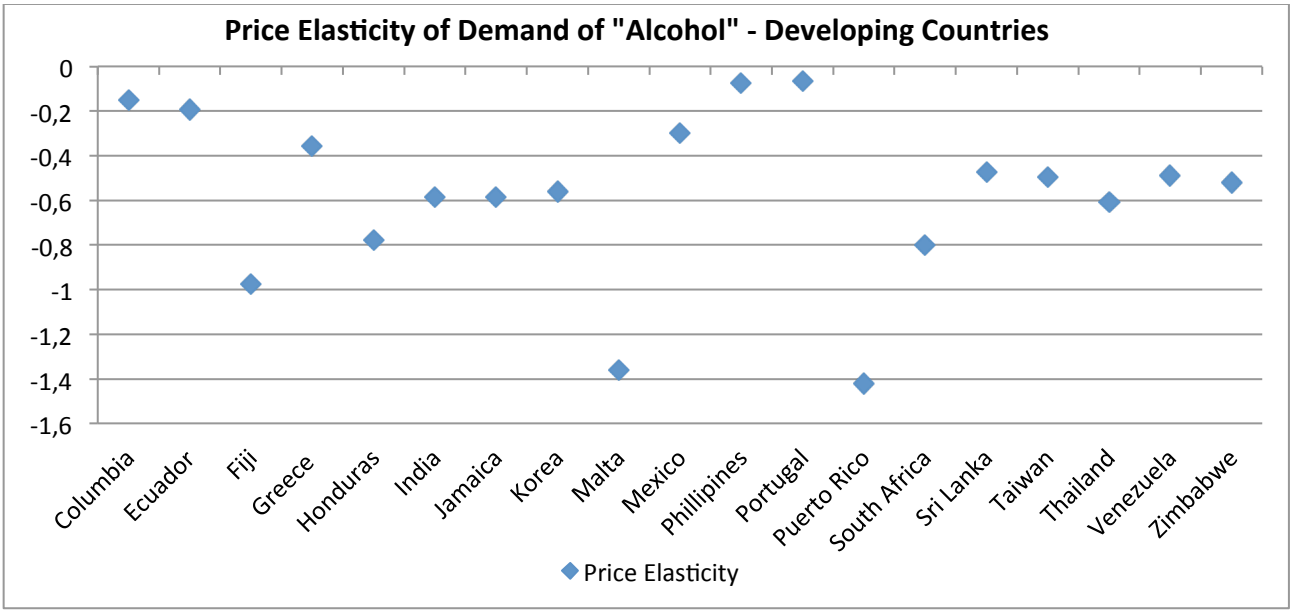
A comprehensive and thorough meta-analysis of demand studies that investigate price, income and cross-price elasticities of demand is well beyond the scope of this study. We leave that for an enthusiastic PhD. student. Also, we have pdf versions of most of the studies listed in the Appendix, and would be able to make them available to researchers on request.

Nevertheless, a superficial analysis of empirical results for other high-income countries suggests that they are similar to Australia in many respects. The own-price elasticity estimates are typically in the inelastic range. The income elasticities are, with minor exceptions, positive, and the income elasticity of spirits is often higher than that of wine and beer. For cross-price elasticities, however, no clear picture emerges. Many studies, because of their design or because of data issues, do not report cross-price elasticities. For those that do report them, there is no consistent picture. One certainly cannot make any dogmatic statements such as “Beer is a substitute for wine and spirits”. It varies from one country to another, and even within a country the sign of the cross-price elasticity can change from one study to the next.

Fewer studies have considered the demand for alcohol in low- and middle-income countries (LMICs) than high-income countries. However, South Africa is a middle-income country, and in principle policy makers would be more interested in comparing South Africa to similar countries than to high-income countries.

Figure 1 provides a graphical representation of the price elasticities for alcohol in 19 low- and middle-income countries, including South Africa. In most instances they refer to “all alcohol” rather than the price elasticities for individual alcohol categories. With two exceptions (Malta and Puerto Rico), the price elasticities fall into the inelastic range. The average and median price elasticity for these countries is between -0.5 and -0.6.

FIGURE 1: *PRICE ELASTICITY OF DEMAND OF ALCOHOL IN DEVELOPING COUNTRIES*

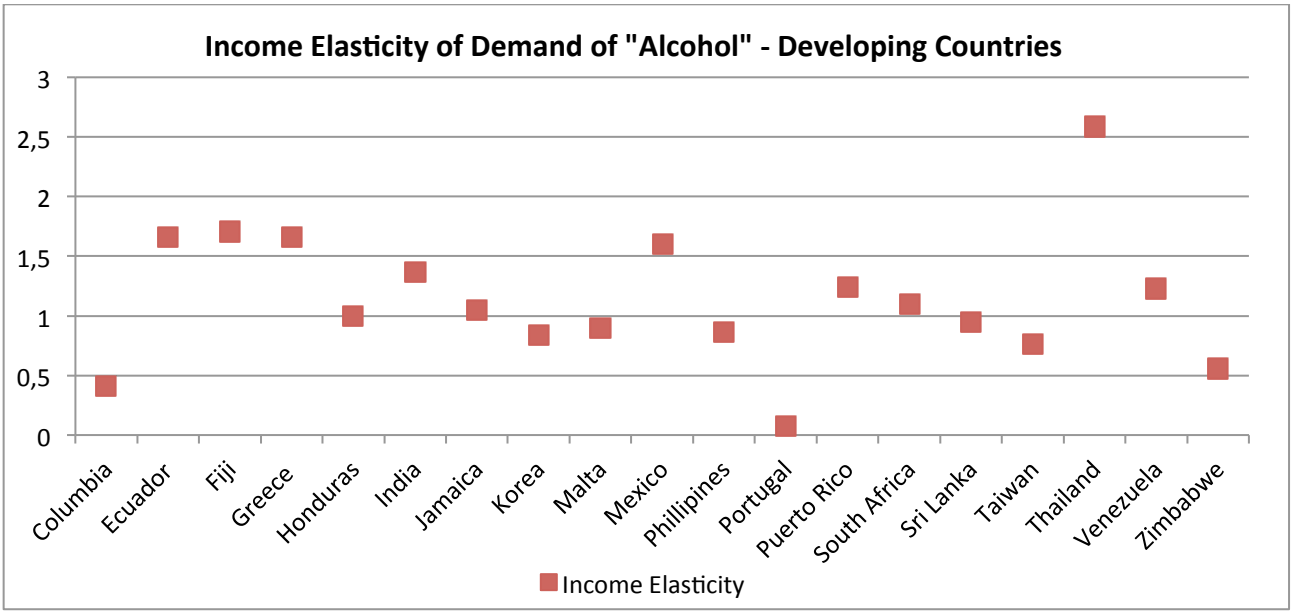


South Africa's price elasticity, which is based on a study by Selvanathan and Selvanathan (2005) is indicated as -0.8. This price elasticity corresponds closely to price elasticity estimates for beer (-0.8), wine (-0.9) and spirits (-0.9) produced by SALBA (2010).

These estimates deviate quite significantly from a previous study by the National Treasury (2002), which estimates a price elasticity for normal beer of -0.40, compared to a price elasticity for light beer of -0.46. The price elasticity of high-price wine is estimated at -0.42, of medium-price wine at -0.84 and of low-price wine at -1.08. The price elasticity of spirits was estimated at -0.75.

Compared to price elasticities of other countries in the study, South Africa's price elasticity of alcohol seems to be at the high end (in absolute terms). The implication is that increases in the price of alcohol in South Africa are a more potent means to reduce alcohol consumption in South Africa than in most of the comparator countries. It also means that an increase in the excise tax is a more effective weapon in reducing alcohol use in South Africa than in the comparator countries.

FIGURE 2: *INCOME ELASTICITY OF DEMAND OF ALCOHOL IN DEVELOPING COUNTRIES*



In Figure 2 the income elasticity of demand for alcohol in the same 19 countries is shown. The income elasticities for the countries shown are all positive and are concentrated in the range 0.8 to 1.6. Thus, to the extent that one can compare price and income elasticities, alcohol is more income elastic than price elastic. South Africa's income elasticity estimate of 1.1, derived from Selvanathan and Selvanathan (2005), is representative of countries in this group.

Selvanathan and Selvanathan's (2005) estimates are substantially higher than the National Treasury's (2002) estimates of the income elasticity. The income elasticity of normal beer was estimated at 0.43 and the income elasticity of light beer was estimated at 0.46. For different price categories of wines, the income elasticities varied between 0.71 and 1.00 (0.71 for low-price wine, 1.00 for medium-price wine and 0.77 for high price wine).

4. IMPLICATIONS

The evidence is clear that alcohol products also respond to changes in its price. As is clear in this paper, a 10% increase in the price of alcohol reduces alcohol consumption by about 4-8% in most low- and middle-income countries for which price elasticity estimates exist. An increase in the price of alcohol will thus counteract the impact of an increase in average income.

If one wishes to reduce the harmful use of alcohol, one needs to understand the determinants of demand for the product. In radio talk shows, for example, it is often argued, especially by the alcohol industry, that people should be provided with more education and information about the product, so that they can make an informed decision about the product. The industry strongly opposes legislative interventions, like the proposed advertising ban, and tax increases. Despite the obvious intuition that better informed people will reduce their alcohol consumption, because they better understand the negative consequences of alcohol abuse, there is very little empirical evidence to suggest that more information substantially reduces alcohol abuse.

In contrast, the many studies listed here indicate that changes in alcohol consumption are determined very strongly by changes in the price of alcohol and changes in income. The results of these studies correspond closely to the empirical literature on the demand for tobacco, where the two main demand determinants are the price of tobacco and income.

Most countries wish to increase average income levels. An increase in average income, usually approximated by an increase in the GDP, allows a country to reduce poverty, unemployment and deprivation. These are the major economic challenges facing South Africa today. The country needs growth. Of course, economic growth comes at a cost (e.g. environmental costs, pollution, rapid and unstructured urbanisation, etc.), but this is typically regarded as a cost worth bearing. One of the negative side effects of economic growth is that people now have the money to buy goods and services that have detrimental health consequences.

This is true for both tobacco and alcohol. An increase in average incomes tends to increase the consumption of these products. However, the benefits of economic growth greatly exceed its costs, and no serious economist would argue against economic growth on the grounds that it would increase the consumption of "bads".

If the price of alcohol stays the same in real terms and average income levels are rising, then the product will become more affordable, as was noted in in Chapter 6. However, should the price increase sufficiently, then the product would not become more affordable, even though average incomes were to rise.

Income growth is a given to public health policy makers. However, policy makers can influence the price of alcohol. As was pointed out in Chapter 3, excise taxes on alcohol have been levied for more than 100 years in South Africa, and there is a general acceptance of them. Since 2012 the total tax burden (i.e. the sum of the excise tax and VAT amount, expressed as a percentage of the average retail price) is set at 23% for wine, 35% for beer and 48% for spirits.

The excise tax is set as a specific tax. Currently the government sets the excise tax such that it maintains these three total tax thresholds. The current policy had its genesis in the 2002 Treasury report. The thresholds were increased in 2012. However, there is nothing that prevents the Treasury from revisiting its current policy. In fact, the Treasury is doing a formal review of its alcohol tax policy at present (Riaan Labuschagne, personal communication).

5. CONCLUSION

There is a large international literature that considers the relationship between alcohol consumption and alcohol prices. The conclusion drawn by this literature is unambiguous, namely that an increase in alcohol prices reduces alcohol consumption. The price elasticity of demand varies from one country to another, but is nearly always in the inelastic range. In fact, for low- and middle-income countries the price elasticity estimates are often between -0.4 and -0.8.

The income elasticity estimates of demand are positive, indicating that an increase in income would increase alcohol consumption. For low- and middle-income countries the income elasticity for alcohol averages around 1.2, with a range of between 0.8 and 1.6 for most countries. Studies that have considered income elasticities for different alcohol categories often find that spirits are more income elastic than wine and especially beer.

By calculating cross-price elasticities one can determine whether different categories of alcohol are substitutes or complements of each other. Data limitations often prevent researchers from investigating these relationships, and even amongst the studies that have estimated cross-price elasticities, no consistent picture emerges.

We have found three South African studies that have estimated the price elasticity of alcohol (National Treasury, 2002, Selvanathan and Selvanathan, 2005 and SALBA[1], 2010). The price and income elasticities for alcohol in South Africa fall within the ranges for low- and middle-income countries.

The National Treasury study considers the price and income elasticities for high-, medium- and low-price wine, and, within the beer category, the price and income elasticities for normal beer and light beer. By making these distinctions, the National Treasury acknowledges that there are different kinds of drinkers. For example, poor people would typically drink low-price wine, while rich people would drink high-price wine. In the next chapter we take this principle further by explicitly looking at the socio-economic factors of consumers and how these influence the decision to drink, and the quantity of alcohol that is consumed. Furthermore, we also investigate the price and income sensitivity of heavy drinkers relative to light and moderate drinkers.

[1] We were unable to locate the original study, but report the results as they were quoted in another study.

TABLE 1: SUMMARY OF PRICE AND INCOME ELASTICITY STUDIES GLOBALLY

*** Indicates it was not possible to obtain the paper, although the results are reported.*

AUTHOR(S) AND DATE	COUNTRY	TIME PERIOD AND DATA	SHORT RUN ELASTICITY (S) OR LONG RUN ELASTICITY (L)	PRICE ELASTICITY			INCOME ELASTICITY			CROSS PRICE ELASTICITY		
				Beer	Wine	Spirits	Beer	Wine	Spirits	Beer	Wine	Spirits
Clements and Selvanathan (1991)	Australia	1955-1986	Rotterdam Conditional	-0.15	-0.32	-0.61	0.73	0.61	2.51	Wine: 0.04 Spirits: 0.11	Beer: 0.18 Spirits: 0.15	Beer: 0.46 Wine: 0.15
Clements and Selvanathan (1991)	Australia	1955-1986	Unconditional	-0.43	-0.37	-0.83	0.73	0.61	2.51	Wine: -0.02 Spirits: 0.05	Beer: -0.05 Spirits: 0.10	Beer: -0.50 Wine: -0.07
Clements et al. (1997)	Australia	1955-1985	Rotterdam Model Frisch elasticities	-0.4	-0.5	-0.91	0.81	1	1.83			
			Rotterdam Model Hicksian elasticities	-0.18	-0.42	-0.77						
**Clements and Selvanathan (1987)	Australia	1956-1977	Working Conditional	-0.35	-0.37	-1.11	0.73	0.62	2.50			
			Working Conditional	-0.12	-0.34	-0.52						
			Working Conditional	-0.63	-0.42	-0.92						
Clements and Selvanathan (1988)	Australia	1956-1977	Rotterdam Model	-0.09	-0.39	-0.41	0.83	0.78	1.97	Wine: 0.04 Spirits: 0.06	Beer: 0.20 Spirits: 0.19	Beer: 0.26 Wine: 0.15
Clements and Johnson (1983)	Australia	1956 - 1977	Rotterdam Conditional elasticities sample means	-0.09	-0.39	-0.41	0.83	0.78	1.97	Wine: 0.04 Spirits: 0.06	Beer: 0.20 Spirits: 0.19	Beer: 0.26 Wine: 0.15
Ramful et al., (2008)	Australia	1991-2001		-0.948	-1.853	-0.725				Wine: 0.421 Spirit: 0.637	Beer: 0.238 Spirit: 1.297	Beer: 0.036 Wine: 0.640
Selvanathan & Selvanathan (2005)	Australia	1955-1998	Rotterdam Model Conditional Elasticities	-0.20	-0.43	-0.64	0.79	1.00	1.80	Wine: 0.07 Spirits: 0.13	Beer: 0.27 Spirits: 0.16	Beer: 0.48 Wine: 0.16
Selvanathan (1991)	Australia	1955-1985	Rotterdam Model	-0.15	-0.60	-0.61	0.84	0.73	1.94	Wine: 0.07 Spirits: 0.08	Beer: 0.32 Spirits: 0.28	Beer: 0.34 Wine: 0.27
Adrian & Ferguson (1987)	Canada	1958-1981	Linear Model Foreign estimates are in brackets and total estimates are highlighted with asterisks	-0.37 (-0.84) -0.17*	-0.61 (-1.27) -0.53*	-0.05 (-0.96) -0.24*	0.23 (1.54)	0.70 (0.62)	0.89 (0.69)	Wine: 0.17 (-0.08) Spirit: 0.18 (-0.08)	Beer: 0.04 (-0.20) Spirit: -0.26 (0.06)	Beer: 0.34 (-0.36) Wine: 0.25 (0.11)
Alley et al (1992)	British Columbia (Canada)	1981-1986	Marshallian elasticities Imported* and US** wine indicated with asterisks. Using the AIDS model	-0.1509	-0.7642 -0.5464* -0.9692**	-1.7603	0.0622	0.2720 0.2938* 0.1080**	0.2622	Wine: -0.1669 -0.3981* -1.4851** Spirits: -0.5125	Beer: -0.0332 Spirits: -0.1896	Beer: -0.5532 Wine: -1.0153 0.4830* 1.0530**

AUTHOR(S) AND DATE	COUNTRY	TIME PERIOD AND DATA	SHORT RUN ELASTICITY (S) OR LONG RUN ELASTICITY (L)	PRICE ELASTICITY			INCOME ELASTICITY			CROSS PRICE ELASTICITY		
				Beer	Wine	Spirits	Beer	Wine	Spirits	Beer	Wine	Spirits
Alley et al (1992)	British Columbia (Canada)	1981-1986	Hicksian elasticities Imported* and US** wine indicated with asterisks Using the AIDS model	-0.1500	-0.7634 -0.545* -0.969**	-1.7562				Wine: -0.1629 -0.3938* -1.4836** Spirits: -0.5087	Beer: -0.0330 Spirits: -0.1888	Beer: -0.5522 Wine: -1.0110
Andrikopoulos et al (1997)	Ontario (Canada)	1958-1987	Domestic: DAIDS Conditional Marshallian estimates. Hickisan estimates in brackets	-0.482 (-0.084)	-0.511 (-0.387)	-0.543 (-0.511)	0.960	2.221	0.083			
Andrikopoulos et al (1997)	Ontario (Canada)		Imported: DAIDS Conditional Marshallian estimates. Hickisian in brackets.	-1.02 (-1.00)	-0.70 (-0.35)	-0.34 (-0.27)	6.378	6.038	0.830			
Clements et al. (1997)	Canada	1965-1982	Rotterdam Frisch own-price elasticities	-0.31	-0.44	-0.52	0.74	1.05	1.25			
Johnson and Oksanen (1977)	Canada	1956-1977 Ordinary Least Squares (OLS), Least Squares Dummy Variables (LSDV) and Generalis-ed Least Square (GLS) models	Panel OLS (S), LSDV and GLS estimates respectively Panel (L) in parenthesis	-0.27 -0.26* -0.25** (-0.33)	-0.67 -0.68* -0.68** (-1.78)	-1.14 -1.13* -1.13** (-1.77)	0.002 -0.02* -0.01**	0.04 0.01* 0.02**	0.11 0.10* 0.10** 0.17			
Lariviere, Larue & Chalfant (2000)	Canada	1979-1987	DAIDS (L) Conditional Hicksian elasticities	-0.507	-0.871	-0.671	0.925	1.114	1.110	Wine: -0.101 Spirits: 0.382	Beer: -0.269 Spirits: 0.885	Beer: 0.361 Wine: 0.312
	Canada	1979-1987	DAIDS (L) Conditional Marshallian elasticities	-0.613	-0.977	-0.917				Wine: -0.254 Spirits: -0.075	Beer: -0.669 Spirits: 0.606	Beer: -0.069 Wine: 0.214
	Canada	1979-1987	DAIDS (S) Conditional Hicksian elasticities	-0.552	-0.780	-0.602				Wine: -0.110 Spirits: 0.416	Beer: -0.242 Spirits: 0.795	Beer: 0.324 Wine: 0.282
	Canada	1979-1987	DAIDS (S) Conditional Marshallian elasticities	-0.660	-0.877	-0.826				Wine: -0.273 Spirits: -0.081	Beer: -0.600 Spirits: 0.544	Beer: -0.063 Wine: 0.193
Selvanathan (1991)	Canada	1953-1982	Rotterdam Model Conditional	-0.26	-0.16	-0.01	0.71	0.97	1.29	Wine: 0.14 Spirits: 0.12	Beer: 0.68 Spirits: -0.52	Beer: 0.12 Wine: -0.10
Selvanathan & Selvanathan (2005)	Canada	1953-1999	Rotterdam Model and Linear Model Conditional Elasticities	-0.22 (-0.43)	-0.48 (-0.57)	-0.29 (-0.49)	0.67 (0.64)	1.18 (1.35)	1.32 (1.35)	Wine: 0.05 Spirits: 0.17	Beer: 0.17 Spirits: 0.30	Beer: 0.19 Wine: 0.09

AUTHOR(S) AND DATE	COUNTRY	TIME PERIOD AND DATA	SHORT RUN ELASTICITY (S) OR LONG RUN ELASTICITY (L)	PRICE ELASTICITY			INCOME ELASTICITY			CROSS PRICE ELASTICITY		
				Beer	Wine	Spirits	Beer	Wine	Spirits	Beer	Wine	Spirits
Tian, G. and Liu, F. (2011)	China	1993-2006	Pooled OLS, Fixed Effects	Probability Price Elasticities -0.057 (Pooled OLS); 0.019 (Province Fixed Effects); 0.009 (Country Fixed Effects) Condition-al level price elasticities -0.292 (Pooled OLS); -0.036 (Province Fixed Effects); -0.055 (Country Fixed Effects)	Probability [2]Price Elasticities -0.007 (Pooled OLS); -0.012 (Province Fixed Effects); -0.017 (Country Fixed Effects) Condition-al level price elasticities -0.102 (Pooled OLS); -0.103 (Province Fixed Effects); -0.101 (Country Fixed Effects)							
Selvanathan & Selvanathan (2005)	Columbia			-0.151[3]			0.410[4]					
Andrikopoulos & Loizides (2000)	Cyprus	1970-1992	DAIDS (D)	-0.35	-0.24	-0.17	1.30	1.03	0.65			
	Cyprus	1970-1992	DAIDS (I)	-1.00	-0.56	-0.72	1.02	0.70	1.45			
Bentzen et al. (1999)	Denmark	1960-1994	Time Series Unconditional elasticities			-1.20	0.06	-0.02	-0.20			
Skog and Melberg (2006)	Denmark	1911-1931	Time Series (Long and Short Run Elasticities. Short Run in brackets) Unconditional			-0.4 (-0.6)						
Selvanathan & Selvanathan (2005)	Ecuador			-0.193			1.661					
Selvanathan & Selvanathan (2005)	Fiji			-0.977			1.706					
Bentzen et al. (1999)	Finland	1960-1994	Time Series Unconditional			-1.20	0.13	0.83	0.32			

[2] The other category in the study was "Liquor" (which obviously didn't include beer).

[3] For **all** studies done by Selvanathan, S. and Selvanthan. E. (2005) on ***developing countries***, they only look at alcohol and not specific alcoholic beverages.

[4] For **all** studies done by Selvanathan, S. and Selvanthan. E. (2005), on ***developing countries*** they only look at alcohol and not specific alcoholic beverages.

AUTHOR(S) AND DATE	COUNTRY	TIME PERIOD AND DATA	SHORT RUN ELASTICITY (S) OR LONG RUN ELASTICITY (L)	PRICE ELASTICITY			INCOME ELASTICITY			CROSS PRICE ELASTICITY		
				Beer	Wine	Spirits	Beer	Wine	Spirits	Beer	Wine	Spirits
Clements et al. (1997)	Finland	1965-1982	Rotterdam Frisch own-price elasticities	-0.61	-1.78	-1.78	0.45	1.32	1.32			
Holm (1995)	Finland	1965-1987	AIDS Conditional	-0.51	-0.51	-0.91	1.47	0.84	0.80			
Holm and Suoniemi (1995)	Finland	1962-1987	AIDS Conditional	-0.38	-2.31	-0.51						
Selvanathan (1991)	Finland	1955-1985		-0.54	-0.86	-0.73	0.40	1.58	1.29	Wine: -0.07 Spirits: 0.61	Beer: -0.19 Spirits: 1.05	Beer: 0.45 Wine: 0.28
Selvanathan & Selvanathan (2005)	Finland	1969-1985		-0.24	-0.78	-0.30	0.44	1.52	1.29	Wine: 0.06 Spirits: 0.18	Beer: 0.16 Spirits: 0.62	Beer: 0.14 Wine: 0.17
Labys (1976)	France	1971-1995	Linear Unconditional		-0.06							
Selvanathan & Selvanathan (2005)	France	1971-1995		-0.06	-0.05	-0.06	0.66	0.88	1.23	Wine: 0.03 Spirits: 0.03	Beer: 0.01 Spirits: 0.04	Beer: 0.01 Wine: 0.05
Selvanathan & Selvanathan (2005)	Greece			-0.357			1.662					
Selvanathan & Selvanathan (2005)	Honduras			-0.780			1.000					
John (2005)	India	1999-2000		**Study only looked at "alcohol", not at specific alcoholic beverages** -1.032 (Rural India) -0.867 (Urban India)						**Study only looked at "alcohol"[5], not at specific alcoholic beverages. Cross Price Elasticity of Alcohol with respect to:** 1. Cigarettes: 0.114 (Rural India); 0.135 (Urban India) 2. Leaf Tobacco: -0.022 (Rural India); -0.028 (Urban India)		
Selvanathan & Selvanathan (2005)	India			-0.584			1.369					
Eakins and Gallagher (2003)	Ireland		Dynamic AIDS (DAIDS) model Long run	-0.765	-1.593	-0.751	1.026	2.326	1.039			
Eakins and Gallagher (2003)	Ireland		Short run	-0.527	-0.796	-0.851	0.157	1.862	0.856			
Thom (1984)	Ireland	1969Q1-1980Q4	AIDS	-0.68	-1.60	-1.42	0.80	1.23	1.39			
Walsh & Walsh (1970)	Ireland	1953-1968	Linear	-0.17		-0.57	0.78		1.94			
Labys (1976)	Italy	1969-1980	AIDS		-1.00			0.28				
Selvanathan & Selvanathan (2005)	Jamaica			-0.587			1.045					
Selvanathan (1991)	Japan	1964-83	Rotterdam	-0.25	0.80	-0.68	1.43	0.29	0.47	Wine: 0.04 Spirits: 0.05	Beer: 1.12 Spirits: -0.62	Beer: 0.08 Wine: -0.04

[5] See Notes section to see what was classified as alcohol.

AUTHOR(S) AND DATE	COUNTRY	TIME PERIOD AND DATA	SHORT RUN ELASTICITY (S) OR LONG RUN ELASTICITY (L)	PRICE ELASTICITY			INCOME ELASTICITY			CROSS PRICE ELASTICITY		
				Beer	Wine	Spirits	Beer	Wine	Spirits	Beer	Wine	Spirits
Selvanathan & Selvanathan (2005)	Japan	1964-2002	Rotterdam Model and Linear in parenthesis	-0.12 (-0.33)	-0.13 (-0.06)	-0.24 (-0.44)	1.28 (1.31)	0.63 (0.50)	1.02 (1.26)	Wine: 0.08 Spirits: 0.04	Beer: 0.11 Spirits: 0.02	Beer: 0.17 Wine: 0.06
Okello (2001)	Kenya	1987-1996	Time Series	**Short Run** -1.1 (Other beer) **Long Run** -5.5 (Guinness Beer)			**Short Run** 0.54 (Other beer) **Long Run** 1.0 (Guinness Beer)			With respect to Guinness Beer (0.3)		
Selvanathan & Selvanathan (2005)	Korea			-0.560			0.842					
Selvanathan & Selvanathan (2005)	Malta			-1.362			0.894					
Selvanathan & Selvanathan (2005)	Mexico			-0.296			1.602					
Clements et al. (1997)	New Zealand	1965-1982	Rotterdam Frisch own-price elasticities	-0.37	-0.39	-0.64	0.84	0.88	1.45			
			Rotterdam Hicksian elasticities	-0.17	-0.34	-0.57						
Pearce (1986)	New Zealand	1965-1982	Rotterdam Conditional elasticities	-0.15	-0.35	-0.32	0.85	1.14	1.31	Wine: 0.04 Spirits: 0.10	Beer: 0.22 Spirits: 0.14	Beer: 0.25 Wine: 0.07
Selvanathan (1991)	New Zealand	1965-1982	Rotterdam	-0.12	-0.42	-0.52	0.90	1.13	1.18	Wine: 0.00 Spirits: 0.12	Beer: -0.01 Spirits: 0.44	Beer: 0.31 Wine: 0.22
Selvanathan & Selvanathan (2005)	New Zealand	1965-1982	Rotterdamn and Linear in Parenthesis	-0.18 (-0.23)	-0.34 (-0.78)	-0.40 (-0.43)	0.84 (0.81)	0.87 (1.15)	1.45 (1.53)	Wine: 0.04 Spirits: 0.14	Beer: 0.20 Spirits: 0.14	Beer: 0.34 Wine: 0.07
Zhang and Casswell (1999)	New Zealand	1984-1997	Time Series	-1.02	-0.71	0.05						
Bentzen et al. (1999)	Norway	1960-1994	Time Series Unconditional				0.36	-0.16	0.14			
Clements et al. (1997)	Norway	1965-1982	Rotterdam Frisch own-price elasticities	-0.03	-0.12	-0.12	0.34	1.48	1.55			
Selvanathan & Selvanathan (2005)	Norway	1962-1996	Rotterdam Model and Linear in parenthesis	-0.04	-0.14 (-0.18)	-0.09 (-0.21)	0.37 (0.40)	1.23 (1.38)	1.72 (1.64)	Wine: 0.01 Spirits: 0.03	Beer: 0.03 Spirits: 0.11	Beer: 0.04 Wine: 0.05
Selvanathan (1991)	Norway	1960-1996	Rotterdam	-0.14	-0.07	-0.18	0.34	1.44	1.56	Wine: -0.48 Spirits: 0.15	Beer: -0.16 Spirits: 0.08	Beer: 0.16 Wine: 0.03
Selvanathan & Selvanathan (2005)	Philippines			-0.072			0.864					
Selvanathan & Selvanathan (2005)	Portugal			-0.065			0.074					

AUTHOR(S) AND DATE	COUNTRY	TIME PERIOD AND DATA	SHORT RUN ELASTICITY (S) OR LONG RUN ELASTICITY (L)	PRICE ELASTICITY			INCOME ELASTICITY			CROSS PRICE ELASTICITY		
				Beer	Wine	Spirits	Beer	Wine	Spirits	Beer	Wine	Spirits
Selvanathan & Selvanathan (2005)	Puerto Rico			-1.422			1.243					
Andrienko and Nemtsov (2006)	Russia	1994-2002		-3.0	-1.0	-1.8 (Vodka only)				With respect to vodka: (4.1)	With respect to beer: (1.2); With respect to vodka: (-1.5)	[6]With respect to beer: (0.8)
National Treasury (2002)	South Africa	Multiple periods: Beer – 1990-1999; Natural Wine – 1989-1996; Spirits – 1985-1997; AFBs and Commerc-ial Sorghum – 1992-2000		-0.4008 (Normal Beer); -0.4684 (Light Beer)	Natural Wine[7]: -0.4211; -0.8363; -1.0765	-0.7505	0.4319 (Normal Beer); 0.4622 (Light Beer)	Natural Wine[8]: 0.7122; 0.9956; 0.7665				
**SALBA	South Africa	2010		-0.8 (Malt beer only)	-1.1 (Unf-ortified wine); -1 (Standard Price wine); -0.9 (Total Wine)	-0.9						
Selvanathan & Selvanathan (2005)	South Arica			-0.799			1.101					
Angulo(2001)	Spain	1990-1991	Cross DH Not Specified *in brackets are conditional elasticities	-2.44 (-1.17)	-1.52 (-1.04)	-4.65 (-1.04)				Wine: 0.05 (-0.02) Spirit: 0.69 (0.13)	Beer: 0.45 (0.34) Spirit: -0.28 (-0.07)	Beer: 0.23 (0.02) Wine: -0.19 (-0.02)
Selvanathan & Selvanathan (2005)	Sri Lanka			-0.472			0.946					
Bentzen et al. (1999)	Sweden	1960-1994	Time Series Unconditional				-0.98	-1.10	0.38			
Clements et al. (1997)	Sweden	1965-1982	Rotterdam Frisch own-price elasticities. Hickisan in parenthesis	-0.30 (-0.28)	-0.99 (-0.88)	-2.18 (-1.94)	0.21	0.69	1.52			

[6] In this study, 'spirits' only refers to vodka.

[7] Note the different elasticities are for high price, medium price and low price wines. However it is not specified in the paper which elasticity relates to which price bracket.

[8] See the above footnote.

AUTHOR(S) AND DATE	COUNTRY	TIME PERIOD AND DATA	SHORT RUN ELASTICITY (S) OR LONG RUN ELASTICITY (L)	PRICE ELASTICITY			INCOME ELASTICITY			CROSS PRICE ELASTICITY		
				Beer	Wine	Spirits	Beer	Wine	Spirits	Beer	Wine	Spirits
Gruenewald (2006)	Sweden	1984M1-1994M10	Linear (SUR) High Quality *Cross price elasticities for high quality (HQ), medium quality (MQ) and low quality (LQ) respectively	-1.704	-0.586	-0.663	0.19	-0.17	-0.16	Wine: -0.136 Spirits: -0.078	Beer: -0.225 & 0.178 for HQ Spirits: -0.078 & 0.112 for HQ	Beer: 0.225 & 0.178 for HQ Wine: -0.136
Gruenewald (2006)	Sweden	1984M1 – 1994M10	Linear (SUR) Medium Quality *Cross price elasticities for high quality (HQ), medium quality (MQ) and low quality (LQ) respectively	-1.704	-0.586	-0.663				Wine: 0.106 Spirits: -0.078 & 0.112 for MQ and HQ	Beer: -0.225 and 0.178 for HQ Spirits: -0.078 & 0.112 for HQ	Beer: -0.225 & 0.178 for HQ Wine: 0.106
Huitfeldt and Jomer (1972)	Sweden	1956-1968		-3.00	-0.70	-1.20						
Malmguist	Sweden	1923-1939			-0.71	-0.37		1.32	0.30			
Norstrom (2005)	Sweden	1984-2003 Box-Jenkins technique for Time-series analysis	Differenced quarterly and monthly respectively	-0.79 -0.90	-0.57 -0.63	-0.96 -0.81						
Selvanathan (1991)	Sweden	1960-1986	Rotterdam Conditional elasticities	-0.35	-0.87	-0.22	0.22	0.48	1.52	Wine: 0.19 Spirits: 0.16	Beer: 0.34 Spirits: 0.54	Beer: 0.08 Wine: 0.15
Selvanathan & Selvanathan (2005)	Sweden	1961-1999	Rotterdam Model Conditional elasticities	-0.45	-0.32	-0.35	0.79	0.46	1.35	Wine: 0.05 Spirits: 0.39	Beer: 0.09 Spirits: 0.23	Beer: 0.25 Wine: 0.09
Selvanathan & Selvanathan (2005)	Taiwan			-0.497			0.762					
Selvanathan & Selvanathan (2005)	Thailand			-0.606			2.585					
Baker & McKay (1990)	United Kingdom	1970-1986	AIDS Unconditional	-0.88	-1.37	-0.94	0.89	1.61	0.98			
Blake et al. (1997)	United Kingdom	1952-1991 Time series study using the AIDS model	DAIDS Long-run elasticity Conditional elasticities in brackets	-1.2724 (-0.9549)	-0.8192 (-0.9309)	-1.3107 (-1.3218)	Between 0.81 – 0.89	Between 1.61 – 1.85	Between 0.98 – 1.1.6	Wine: 0.1921 Spirits: -0.7615	Beer: -0.0539 Spirits: 0.0305	Beer: 0.3405 Wine: 0.6213
Clements et al. (1997)	United Kingdom	1955-1985	Rotterdam Frisch own-price elasticities Hicksian elasticities in parenthesis	-0.44 (-0.24)	-0.57 (-0.48)	-0.72 (-0.60)	0.82	1.06	1.34			
Clements and Selvanathan (1988)	United Kingdom	1955-1975	Rotterdam Model	-0.21	-0.13	-0.30	0.41	1.93	1.80	Wine: 0.05 Spirits: 0.16	Beer: 0.20 Spirits: -0.07	Beer: 0.34 Wine: -0.04

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				Beer	Wine	Spirits	Beer	Wine	Spirits	Beer	Wine	Spirits
Crawford & Tanner (1995)	United Kingdom	1993	AIDS Conditional elasticities	-0.668	-1.396	-1.181						
Crawford & Tanner (1995)	United Kingdom	1992	AIDS Conditional elasticities	-0.90	-0.70	-1.42						
Crawford & Tanner (1999)	United Kingdom	1989-1992	AIDS	-0.74	-1.85	-0.86				Wine: -0.73 Spirits: -0.59	Beer: -0.19 Spirits: 0.67	Beer: -0.22 Wine: 0.94
Crawford & Tanner (1999)	United Kingdom	1993-1996	AIDS	-0.76	-1.69	-0.86				Wine: -0.60 Spirits: -0.59	Beer: -0.17 Spirits: 0.66	Beer: -0.20 Wine: 0.77
Duffy (1983)	United Kingdom	1963Q1-1978Q4	Linear (OLS) Unconditional	0.23	0.87	-0.79	1.07	2.54	1.61			
Duffy (1983)	United Kingdom	1963Q1-1978Q4	Linear (2SLS) Unconditional	0.20	-1.00	0.76	0.85	2.22	1.67			
Duffy (1987)	United Kingdom	1963-1983	Rotterdam Conditional elasticities	-0.2896	-0.7742	-0.5051	0.5982	1.7011	1.4217	Wine: 0.4744 Spirits: 0.3227	Beer: 0.1367 Spirits: 0.1825	Beer: 0.1528 Wine: 0.2998
			Unconditional elasticities	-0.3602	-1.1293	-0.8544	0.7067	2.1828	1.7817	Wine: 0.0624 Spirits: -0.0206	Beer: 0.0180 Spirits: -0.0123	Beer: -0.0098 Wine: -0.0203
Duffy (2002)	United Kingdom	1963Q1-1999Q4	AIDS (ECM)	-0.391	-0.139	-0.673	0.934	0.706	1.382	Wine: 0.752 Spirits: 0.301	Beer: -0.072 Spirits: 0.274	Beer: 0.431 Wine: -0.397
Duffy (2002)	United Kingdom	1963Q1-1999Q4	AIDS SURE	-0.371	-0.223	-0.925	0.979	0.848	1.169	Wine: 0.639 Spirits: 0.343	Beer: -0.142 Spirits: 0.501	Beer: 0.462 Wine: -0.168
Duffy (2001)	United Kingdom	1964Q1-1996Q4	AIDS Conditional elasticities	-0.121	-0.666	-0.723	0.792	1.176	1.335	Wine: 0.111 Spirits: 0.011	Beer: 0.032 Spirits: 0.634	Beer: 0.249 Wine: 0.475
Duffy (2001)	United Kingdom	1964Q1-1996Q4	Rotterdam model Conditional elasticities	-0.131	-0.834	-0.716	0.765	1.246	1.343	Wine: 0.045 Spirits: 0.086	Beer: 0.045 Spirits: 0.524	Beer: 0.192 Wine: 0.699
Duffy (2001)	United Kingdom	1964Q1-1996Q4	CBS model	-0.155	-0.823	-0.761	0.776	1.283	1.292	Wine: 0.045 Spirits: 0.109	Beer: 0.135 Spirits: 0.687	Beer: 0.246 Wine: 0.515
Duffy (2001)	United Kingdom	1964Q1-1996Q4	NBR Model	-0.097	-0.679	-0.678	0.782	1.140	1.386	Wine: 0.011 Spirits: 0.086	Beer: 0.033 Spirits: 0.646	Beer: 0.194 Wine: 0.484
Godfrey (1988)	United Kingdom	1956-1980	Linear Unconditional elasticities		-0.88	-0.84		2.34	1.53			
Godfrey (1988)	United Kingdom	1956-1980	Linear Unconditional elasticities	-0.14	-1.23	-1.07	0.06	1.54	1.51			
Jones (1989)	United Kingdom	1964-1983	Habit Model and Non-Habit Model	-0.272 (-0.395)	-0.768 (-0.938)	-0.948 (-0.794)	0.307 (0.500)	1.462 (1.666)	1.143 (1.206)	Wine: 0.103 Spirits: -0.172	Beer: 0.288 Spirits: -0.152	Beer: -0.456 Wine: -0.108
McGuinness (1983)	United Kingdom	1956-1979	Linear Unconditional elasticities	-0.30	-0.17	-0.38	0.13	1.11	1.54			

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				Beer	Wine	Spirits	Beer	Wine	Spirits	Beer	Wine	Spirits
Prest (1949)	United Kingdom	1870-1938	Linear Unconditional elasticities	-0.66		-0.86	0.23		0.74			
Moosa and Baxter (2002)	United Kingdom	1964Q1-1995Q1	AIDS (KL) Conditional elasticities	-3.2	-2.3		-1.8	2.3		Wine: 3.7	Beer: 2.2	
Salisu and Balasubrama-nyam (1997)	United Kingdom	1963-1993	Tine (S) Time (L)	-0.21 -0.32	-0.55 -0.66	-1.52 -1.28	0.37 0.76	0.77 1.42	0.59 0.88			
Selvanathan (1988)	United Kingdom	1956	Working Conditional Elasticities	-0.13	-0.37	-0.32	0.55	1.23	1.82	**		
Selvanathan (1988)	United Kingdom	1985	Working Unconditional Elasticities	-0.20	-0.49	-0.79	0.41	1.74	2.18	**		
Selvanathan (1991)	United Kingdom	1955-1985	Rotterdam	-0.13	-0.40	-0.31	0.52	1.31	1.83			
Selvanathan & Selvanathan (2005)	United Kingdom	1955-2002	Rotterdam Conditional Elasticities	-0.27	-0.35	-0.56	0.88	0.67	1.51			
Selvanathan & Selvanathan (2005)	United Kingdom	1955-2002	Linear Conditional Elasticities	-0.67	-0.41	-0.80	0.80	0.91	1.44			
**Stone and Rowe (1958)	United Kingdom	1950-1956	Linear Short run	-0.53			0.68					
			Linear (Long run)	-0.40			0.52					
Stone (1945)	United Kingdom	1929-1941	Linear Unconditional elasticities	-0.73		-0.72	0.14		0.54			
Walsh (1982)	United Kingdom	1956-1975	Linear Unconditional elasticities	-0.13	-0.28	-0.47	0.13	0.51	1.20			
Wong (1988)	United Kingdom	1920-1938	Rotterdam Model Unconditional elasticities	-0.64	-1.15	-0.65	0.95	1.59	0.96			
			Conditional elasticities	-0.25	-0.99	-0.51	0.94	1.62	0.94			
Baltagi & Goel (1990)	United States	1960-1983	Experimental Unconditional elasticities						-0.63			
Baltagi & Griffin (1995)	United States	1959-1982	Panel (S) Unconditional			-0.20			0.03			
Clements and Selvanathan (1988)	United States	1949-1982	Rotterdam Model	-0.09	-0.05	-0.10	0.76	0.66	1.31	Wine: -0.00 Spirits: 0.09	Beer: -0.02 Spirits: 0.07	Beer: 0.09 Wine: 0.01
Cook and Tauchen (1982)	United States	1962-1977	Panel			-1.80			0.43			
Comanor & Wilson (1974)	United States	1947-1964	Short-run	-0.56	-0.68	-0.25						
Comanor & Wilson (1974)	United States	1947-1964	Long-run	-1.39	-0.84	-0.30						
Coulson et al (2001)	United States	1970Q1-1990Q4	Time Series Long-run	-0.27	-0.59	-0.34	-0.27	0.76	0.22			

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				Beer	Wine	Spirits	Beer	Wine	Spirits	Beer	Wine	Spirits
Gallet (1999)	United States	1964-1966	Linear Switch Unconditional			-1.35			0.67			Beer: -0.92 Wine: 0.11
Gallet (1999)	United States	1978-1992	Linear Switch Unconditional			-0.16			-0.29			Beer: 0.47 Wine: -0.48
Gallet and List (1998)	United States	1964-1973	Linear Switch Unconditional	-1.72			-0.26			Wine: 0.66		
Gallet and List (1998)	United States	1983-1992	Linear Switch Unconditional	0.26			-0.83			Wine: -0.09		
Gao X.M et al. (1995)	United States	1987-1988	Synthetic Model Conditional and Unconditional Elasticities respectively	-0.2297 (-0.219)	-0.4041 (-0.699)	-0.2486 (-0.317)	-0.0880	5.0309	1.2073	Wine: 0.3106 Spirits: 0.1523	Beer: 0.1556 Spirits: 0.0963	Beer: 0.0741 Wine: 0.0935
Goel and Morey (2001)	United States	1952-1982	Panel (2SLS)			-0.15			0.88			
			Panel (2SLS)			-0.17						
Hausman et al (1994)	United States	16 years	Linear	-1.95								
Heinen and Pompelli (1989)	United States	1977/1978	AIDS (CS)	-0.84	-0.50	-0.55	1.94	2.66	2.10			
Hogarty and Elzinga (1972)	United States	1956-1959	Linear (CS)	-0.90			0.43					
Labys (1976)	United States	1954-1971	Linear Domestic		-0.44			2.34				
		1954-1971	Linear Imported		-1.65			3.34				
Lee and Tremblay (1992)	United States	1953-1983	Linear (S) Unconditional	-0.61			0.08					
	United States	1953-1983	Linear (L) Unconditional	-0.81			0.11					
**Levi and Fowler (1995)	United States	1970-1991	Linear Unconditional		-0.16			-0.58				
Nelson (1997)	United States	1974-1990	Rotterdam Model General and Conditional elasticities	-0.1148 (-0.1582)	-0.0512 (-0.5246)	-0.4334 (-0.3889)	0.1381 (0.6558)	0.1953 (0.9289)	0.3140 (1.4972)	Wine: -0.1627 (-0.0158) Spirits: -0.2622 (0.2233)	Beer: -0.0361 (-0.0035) Spirits: -0.0824 (0.1655)	Beer: -0.1899 (0.1617 Wine: -0.2689 (0.5404)
Nelson (1997)	United States	1974-1990	Unconditional elasticities	-0.27	-0.58	-0.82	0.14	0.20	0.31			
Nelson (2003)	United States	1982-1997	Panel Unconditional	-0.16	-0.20	0.06	-0.06	1.93	0.39			
Nelson (1999)	United States	1977Q3-1990Q4	Rotterdam Conditional	-0.11	-0.44	-0.10	0.77	1.90	1.06			
Nelson and Maron (1995)	United States	1964-1990	Slutsky price elasticities Rotterdam model	-0.036	-0.094	-0.103	0.768	1.277	1.205	Wine: -0.017 Spirits: 0.053	Beer: -0.083 Spirits: 0.177	Beer: 0.061 Wine: 0.042
Nelson and Maron (1995)	United States	1964-1990	AIDS model	-0.080	-0.258	-0.128	0.805	1.402	1.133	Wine: 0.011 Spirits: 0.068	Beer: 0.056 Spirits: 0.203	Beer: 0.080 Wine: 0.048

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				Beer	Wine	Spirits	Beer	Wine	Spirits	Beer	Wine	Spirits
Nelson and Maron (1995)	United States	1964-1990	NBR model	-0.069	-0.274	-0.126	0.773	1.312	1.192	Wine: 0.008 Spirits: 0.061	Beer: 0.042 Spirits: 0.232	Beer: 0.071 Wine: 0.055
Nelson and Maron (1995)	United States	1964-1990	CBS model	-0.049	-0.071	-0.106	0.800	1.359	1.148	Wine: -0.014 Spirits: 0.062	Beer: -0.068 Spirits: 0.139	Beer: 0.073 Wine: 0.033
**Niskanen (1962)	United States	1934-1960	Linear Unconditional	-0.70	-0.98	-1.90	0.38	0.61	0.29			
**Norman (1975)	United States	1946-1970		-0.87								
Ornstein and Hanssens (1985)	United States	1974-1978	Linear Unconditional			-0.92			0.44			
Selvanathan (1991)	United States	1949-1982	Rotterdam Model	-0.11	-0.05	-0.11	0.71	0.63	1.36	Wine: 0.00 Spirits: 0.10	Beer: 0.02 Spirits: 0.04	Beer: 0.11 Wine: 0.01
Selvanathan & Selvanathan (2005)	United States	1950-2000	Rotterdam Conditional elasticities	-0.13	-0.27	-0.18	0.80	1.06	1.24	Wine: 0.02 Spirits: 0.11	Beer: 0.12 Spirits: 0.15	Beer: 0.14 Wine: 0.03
Selvanathan & Selvanathan (2005)	United States	1950-2000	Linear Conditional elasticities	-0.29	-0.39	-0.26	0.81	1.18	1.35			
**Simon (1966)	United States	1950-1961	Experimental Unconditional			-0.79						
**Smith (1976)	United States	1970	Linear (CS)			-1.50			1.75			
Tegene (1990)	United States	1954-1979	Time Series	-0.714	-1.11	-1.183	0.497	0.661	1.715	Wine: 1.007 Spirits: 0.789	Beer: 0.284 Spirits: 0.815	Beer: 0.147 Wine: 1.113
Trolldal and Ponicki (2005)	United States	1982-1999	Panel Unconditional License states Representing beer using instrumental variables	-0.243	-0.018	-0.249	0.20	0.29	0.21			
Uri (1986)	United States	1982	Linear (CS)	-1.0699	-0.8783	-1.2112	1.46	2.02	0.23	Wine: 0.4846 Spirits: 0.3104	Beer: 0.4846 Spirits: 0.6178	Beer: 0.3104 Wine: 0.6178
**Wang, Gao, Wailes and Cramer (1996)	United States	1987-1988	Synthetic model Hicksian elasticities, quality adjusted prices and quality unadjusted prices respectively	-0.3470 (-0.3664)	-0.5947 (-0.6421)	-0.6882 (-1.1603)	1.0101	1.0023	0.9612	Wine: 0.1897 (0.2162) Spirits: 0.1574 (0.1495)	Beer: 0.4855 (0.5187) Spirits: 0.1095 (0.0802)	Beer: 0.5415 (0.8442) Wine: 0.1467 (0.3163
	United States		Marshallian elasticities	-0.9479	-0.8273	-0.8545				Wine: -0.0451 Spirits: -0.0173	Beer: -0.1105 Spirits: -0.0640	Beer: -0.0305 Wine: -0.0764
	United States	Nested model	Rotterdam, CBS and AIDS model respectively	-0.5166 -0.0953 -0.3621	-0.9271 -0.0772 -0.6263	-0.7341 -0.3009 -0.7072	1.0951 0.9913 1.0122	0.6101 0.9743 0.9947	1.1956 1.0612 0.9644			
Selvanathan & Selvanathan (2005)	Venezuela			-0.488			1.230					
Selvanathan & Selvanathan (2005)	Zimbabwe			-0.522			0.555					

REFERENCES

Adrian, M. and B.S. Ferguson. 1987. Demand for Domestic and Imported Alcohol in Canada, *Applied Economics*, 16(4), pp. 531-540.

Alley, A.G., D.G. Ferguson and K.G. Steward. 1992. An Almost Ideal Demand System for Alcoholic Beverages in British Columbia, *Empirical Economics*, 17(3), pp. 401-418.

Andrienko, Y. and A. Nemtsov. 2006. *Estimation of Individual Demand for Alcohol*. CEFIR/NES Working Paper No. 89.

Andrikopoulos, A.A. and J. Loizides. 2000. The Demand for Home-Produced and Imported Alcoholic Beverages in Cyprus: The AIDS Approach, *Applied Economics*, 32(9), pp. 1111-1119.

Andrikopoulos, A.A., J.A. Brox and E. Carvalho. 1997. The Demand for Domestic and Imported Alcoholic Beverages in Ontario, Canada: A Dynamic Simultaneous Equation Approach, *Applied Economics*, 29(7), pp. 945 -953.

Angulo, A. M., Gil, J. M., Gracia, A. 2001. The demand for alcoholic beverages in Spain, *Agricultural Economics*, 26, pp. 71-83.

Baker, P. and S. McKay. 1990. *The Structure of Alcohol Taxes: A Hangover from the Past*, The Institute for Fiscal Studies, London.

Banks, J., Blundell, R. & Lewbel, A. *Quadratic Engel Curves and Consumer Demand.* The Review of Economics and Statistics, Vol. 79, No. 4. (Nov., 1997), pp. 527-539

Bentzen J., T. Eriksson and V Smith. 1999. Rational Addiction and Alcohol Consumption: Evidence form the Nordic Countries, *Journal of Consumer Policy*, 22(3), pp. 257-279.

Baltagi B.H and R.K. Goel. 1990. Quasi-Experimental Price Elasticity of Liquor Demand in the United States: 1960-83, *American Journal of Agricultural Economics*, 72(2), 451-454.

Baltagi B.H and J.M. Griffin. 1995. A Dynamic Demand Model for Liquor: The Case for Pooling, *The Review of Economics and Statistics*, 77(3), pp. 545-554.

Baltagi B.H and J.M. Griffin. 2002. Rational Addiction to alcohol: Panel Data Analysis of Liquor Consumption, *Health Economics*, 11(6), pp. 485-491.

Blake, D. and A. Nied. 1997. The Demand for Alcohol in the United Kingdom, *Applied Economics*, 29(12), pp. 1655-1672.

Chaloupka, FJ and Warner, KE, 1999. *The economics of smoking*. Working paper 7047, National Bureau of Economic Research, Cambridge, MA: NBER.

Clements, K.W. and L.W. Johnson. 1983. The Demand for Beer, Wine, and Spirits: A Systemwide Analysis, *Journal of Business*, 56(3), pp. 273-304.

Clements, K.W. and E.A Selvanathan. 1987. Alcohol Consumption, in H. Theil and K.W. Clements *Applied Demand Analysis: Results from System-Wide Approaches*, Ballinger, Cambridge, Massachusetts.

Clements, K.W. and E.A. Selvanathan. 1988. The Rotterdam Model and its Application to Marketing, *Marketing Science*, 7(1), pp. 60-75.

Clements, K.W. and H. Theil. 1987. *Applied Demand Analysis: Results from System-Wide Approaches*, Ballinger, Cambridge, Massachusetts.

Clements, K.W. and S. Selvanathan. 1991. The Economic Determinants of Alcohol Consumption, *Australian Journal of Agricultural Economics*, 35(2), pp. 209-231.

Clements, K.W., W.Yang and S.W. Zheng. 1997. Is Utility Additive? The Case of Alcohol, *Applied Economics*, 29(9), pp. 1163-1167.

Comanor, W. S. and T. A. Wilson. 1974. *Advertising and Market Power*. Harvard University Press: Cambridge, Massachusetts.

Cook, P.J. and G. Tauchen. 1982. The Effect of Liquor Taxes on Heavy Drinking, *Bell Journal of Economics*, 13(2), pp. 379-390.

Coulson, N. E., J. R. Moran and J.P. Nelson. 2001. The Long-run Demand for Alcoholic Beverages and the Advertising Debate: A Cointegration Analysis in M.R. Bayes and J.P. Nelson (eds) *Advertising and Differentiated Products*, 10, pp. 31-54.

Crawford, I. and S. Tanner. 1995. Bringing it all Back Home: Alcohol Taxation and Cross-Border Shopping, *Fiscal Studies*, 16(2), pp. 94-114.

Crawford, I., X. Smith and S. Tanner. 1999. Alcohol Taxes, Tax Revenues and the Single European Market, *Fiscal Studies*, 20(3), pp. 287-304.

Deaton, A. S., and J. Muellbauer, *An Almost Ideal Demand System,* American Economic Review70 (1980), 312-336.

Duffy, M. 1983. The Demand for Alcoholic Drink in the United Kingdom, 1963-78, *Applied Economics*, 15(1), pp. 125-140.

Duffy, M. 1987. Advertising and the Inter-Product Distribution of Demand: A RotterdamModel Approach, *European Economic Review*, 31, pp. 1051-1070.

Duffy, M. 2001. Advertising in Consumer Allocation Models: Choice of Functional Form, *Applied Economics*, 33(4), pp. 437-456.

Duffy, M. 2002. On the Estimation of an Advertising-Augmented, Cointegrating Demand System, *Economic Modelling*, 20(1), pp. 181-206.

Eakins, J.M. and L.A. Gallagher 2003. Dynamic Almost Ideal Demand Systems: An Empirical Analysis of Alcohol Expenditure in Ireland, *Applied Economics*, 35(9), pp.1025-1036.

Engle, RF and Granger, CWJ. 1987. *Co-integration and error correction representation.* *Econometrica*, 55: 251-276.

Fogarty, J. 2008. *The Demand for Beer, Wine and Spirits: Insights from a meta analysis approach*. American Association of Wine Economists, AAWE Working Paper No. 31.

Gallet, A. 1999. Gradual Switching Regression Estimates of Alcohol Demand Elasticities, *Applied Economics Letters*, 6(6), pp. 377-379.

Gallet, C.A. and J.L. List. 1998. Elasticity of Beer Demand Revisited, *Economics Letters*, 61(1), pp. 67-71.

Gao, X.M., E.J. Wailes and G.L. Cramer. 1995. A Microeconometric Model Analysis of U.S. Consumer Demand for Alcoholic Beverages, *Applied Economics*, 27(1), pp.59-69.

Godfrey, C. 1988. Licensing and the Demand for Alcohol, *Applied Economics*, 20(11), pp. 1541-1558.

Gruenewald P.J., W.R. Ponicki, H.D. Holder and A Romelsjö. 2006. Alcohol Prices, Beverage Quality, and the Demand for Alcohol: Quality Substitutions and Price Elasticities, *Alcoholism: Clinical and Experimental Research*, 30(1), pp. 96-105.

Hausman, J., G. Leonard and J.D. Zona. 1994. Competitive Analysis with Differentiated Products, *Annales d'Economie et de Statistique,* 43, pp. 159-180.

Hogarty, T.F. and K.G. Elzinga. 1972. The Demand for Beer, *Review of Economics and Statistics*, 54(2), pp. 195-198.

Holm, P. 1995. Alcohol Content and Demand for Alcoholic Beverages: A System Approach. *Empirical Economics*, 20(1), pp. 75-92.

Holm, P. and I. Suoniemi. 1992. Empirical Application of Optimal Commodity Tax Theory to Taxation of Alcoholic Beverages. *Scandinavian Journal of Economics*, 94(1), pp. 85-101.

Huitfeldt, B. and U. Jorner. 1972. *The Demand for Alcoholic Beverages in Sweden*, Stockholm, Government Official Reports.

International Agency for Research on Cancer (IARC). 2011. IARC Handbook volume 14: Effectiveness of Tax and Price Policies for Tobacco Control. Lyon, France; IARC.

Johansen, S. 1995. *Likelihood-Based Inference in Cointegrated Vector Autoregressive Models,* New York: Oxford University Press.

John, R. M. 2005. *Price Elasticity Estimates for Tobacco and Other Addictive Goods in India*. Indira Gandhi Institute of Development Research, Working Paper Series No. WP-2005-003.

Johnson, J.A. and E.H. Oksanen. 1977. Estimation of Demand for Alcoholic Beverages in Canada from Pooled Time Series and Cross Sections, *Review of Economics and Statistics*, 59(1), pp. 113-118.

Jones, A.M. 1989. A Systems Approach to the Demand for Alcohol and Tobacco, *Bulletin of Economic Research*, 41(2), pp. 3307-3378.

Jorgenson, DW and Lau, LJ. 1975. *The structure of consumer preferences*. Annals of Economic and Social Measurement 4: 49-101.

Labys, W. C. 1976. An International Comparisons of Price and Income Elasticities for Wine Consumption. *Australian Journal of Agricultural Economics*, 20(1), pp. 33-36.

Larivière E., B Larue and J. Chalfant. 2000. Modeling the Demand for Alcoholic Beverages and Advertising Specifications, *Agricultural Economics*, 22, pp. 147-162.

Lee, B. and V.J. Tremblay. 1992. Advertising and the U.S. Market Demand for Beer, *Applied Economics*, 24(1), pp. 69-76.

Levi A.E. and R.J. Fowler. 1995. US Demand for Imported Wine, *Journal of International Food and Agribusiness Marketing*, 7(1), pp. 79-91.

Malmquist, S. 1948. *A Statistical Analysis of the Demand for Liquor in Sweden*, University of Uppsala, Uppsala.

McGuiness, T. 1980. An Econometric Analysis of Total Demand for Alcoholic Beverages in the U.K., 1956-75, *Journal of Industrial Economics*, 29(1), pp. 85-109.

McGuinness, T. 1983. The Demand for Beer, Spirits and Wine in the UK, 1956-79, in M.Grant, M. Plant and A. Williams (eds) *Economics and Alcohol: Consumption and Controls*, Croom Helm, Canberra.

National Treasury. *The Taxation of Alcoholic Beverages in South Africa*. Pretoria, 2002.

Nelson, J.P. 1997. Economic and Demographic Factors in US Alcohol Demand: A Growth-Accounting Analysis, *Empirical Economics*, 22(1), pp. 83-102.

Nelson, J.P. and J.R. Moran. 1995. Advertising and US Alcoholic Beverage Demand: System Wide Estimates, *Applied Economics*, 27(12), pp. 1225-1236.

Niskanen, W.A. 1962. *The Demand for Alcoholic Beverages*, PhD thesis, University of Chicago, Department of Economics, Chicago, Illinois.

Norman, D. 1975. *Structural Change and Performance in the Brewing Industry*, Unpublished dissertation, Los Angeles, University of California.

Norström, T. 2005. The Price Elasticity for Alcohol in Sweden 1984-2003, *Nordisk Alkohol and Narkotikatidskrift* (English Supplement), 22, pp. 87-101.

Okello, A. 2001. *An Analysis of Excise Taxation in Kenya*. African Economic Policy Discussion Paper Number 73, Ministry of Finance, Kenya.

Ornstein, S.I. and D.M. Hanssens. 1985. Alcohol Control Laws and the Consumption of Distilled Spirits and Beer, *Journal of Consumer Research*, 12(2), pp. 200-213.

Pearce, D. 1986. *The Demand for Alcohol in New Zealand*. Discussion Paper No. 86.02, Department of Economics, The University of Western Australia.

Prest, A.R. 1949. Some Experiments in Demand, *Review of Economics and Statistics*, 31(1), pp. 33-49.

Ramful, P. and X. Zhao. 2008. Individual Heterogeneity in Alcohol Consumption: The Case of Beer, Wine and Spirits in Australia, *The Economic Record*, 84(265), pp. 207- 222.

SALBA. 2010. Alcohol Excise Taxation Workshop, Presentation to National Treasury. 21 September.

Salisu, M.A. and V.N. Balasubramanyam. 1997. Income and Price Elasticities of Demand for Alcoholic Drinks, *Applied Economics Letters*, 4(4), pp. 247-51.

SANHANES. 2013. SANHANES: Health and Nutrition [online] Available: http://www.hsrc.ac.za/en/research-areas/Research_Areas_PHHSI/sanhanes-health-and-nutrition *[Accessed 19 November 2013]*

Selvanathan, E.A. 1988. Alcohol Consumption in the UK, 1955-85: A System Wide Analysis, *Applied Economics*, 20(8), pp. 1071-1086.

Selvanathan, S. and E.A. Selvanathan. 2005. *The Demand for Alcohol, Tobacco and Marijuana: International Evidence*, Ashgate Publishing, Aldershot, England.

Selvanathan, S. and E.A. Selvanathan. 2004. Economic and Demographic Factors in Australian Alcohol Demand, *Applied Economics*, 36(21), pp. 2405-2417.

Selvanathan, E.A. 1991. Cross-Country Alcohol Consumption Comparison: An Application of the Rotterdam Demand System, *Applied Economics*, 23(10), pp. 1613-1622.

Simon, J.L. 1966. The Price Elasticity of Liquor in the U.S. and a Simple Method of Determination, *Econometrica*, 34(1), pp. 193-205.

Skog, O-L. and O. Melberg. 2006. Becker's Rational addiction theory: an empirical test with price elasticities for distilled spirits in Denmark 1911-31. *Addiction*, 101, pp. 1444-1450.

Smith, R.T. 1976. "The Legal and Illegal Markets for Taxed Goods: Pure Theory and an Application to State Government Taxation of Distilled Spirits". [online] Available: http://heinonline.org/HOL/Page?handle=hein.journals/jlecono19&div=33&g_sent=1&collection=journals *[Accessed 6 July]*

Southern Africa Labour and Development Research Unit. National Income Dynamics Study 2012, Wave 3 [dataset]. Version 1.0. Cape Town: Southern Africa Labour and Development Research Unit [producer], 2013. Cape Town: DataFirst [distributor], 2013.

Stone, R. 1945. The Analysis of Market Demand, *Journal of the Royal Statistical Society*, 108(34), pp. 286-391.

Tegene, A. 1990. The Kalman Filter Approach for Testing Structural Change in the Demand for Alcoholic Beverages in the U.S., *Applied Economics*, 22(10), pp. 1407-1416.

Theil, H. 1965. *The information approach to demand analysis.* Econometrica, 33: 67-87.

Theil, H. 1976. *Theory and measurement of consumer demand*. Vols. 1 and 2, Amsterdam.

Thom, D.R. 1984. The Demand for Alcohol in Ireland, *Economic and Social Review*, 15, pp. 325-36.

Tian, G. and F. Liu. 2011. Is the Demand for Alcoholic Beverages in Developing Countries Sensitive to Price? Evidence from China. *International Journal of Environmental Research and Public Health*, 8, pp. 2124-2131.

Trolldal, B and W. Ponicki. 2005. Alcohol Price Elasticities in Control and License States, *Addiction*, 100, pp. 1158-65.

Uri, N.D. 1986. The Demand for Beverages and Interbeverage Substitution in the United States, *Bulletin of Economic Research*, 38(1), pp. 77-85.

Van Walbeek, CP. 2005. *The Economics of Tobacco Control in South Africa. Thesis* [online] Available: http://www.commerce.uct.ac.za/economics/staff/cwalbeek/research.asp *[Accessed 20 November 2013]*

Van Walbeek, CP. 2006. Industry responses to the tobacco excise tax increases in South Africa. *South African Journal of Economics* 74(1): 110-122.

Walsh, B.M. and D. Walsh. 1970. Economic Aspects of Alcohol Consumption in the Republic of Ireland, *Economic and Social Review*, 12, pp. 115-138.

Walsh, B. M. 1982. The Demand for Alcohol in the UK: A Comment, *Journal of Industrial Economics*, 30(4), pp. 439-446.

Wang J., X.M Gao, E.J Wailes and G.L Cramer. 1996. U.S. Consumer Demand for Alcoholic Beverages: Cross-Section Estimation of Demographic and Economic Effects, *Review of Agricultural Economics*, 18(3), pp. 477-89.

WHO. 2010. Technical Manual on Tobacco Tax Administration. [online] Available: http://www.who.int/tobacco/publications/en_tfi_tob_tax_section1.pdf *[Accessed 10 November 2013]*

Wong, A.T-T. 1988. *The Demand for Alcohol in the UK 1920-1938: An Econometric Study*, Discussion Paper No. 88.13, Department of Economics, University of Western Australia.

Zhang, J. and S. Casswell. 1999. The effects of real price and a change in the distribution system on alcohol consumption. *Drug and Alcohol Review, 18*, pp. 371-378.

THE ECONOMICS OF ALCOHOL POLICY IN SOUTH AFRICA

CHAPTER 8

The Demand for Alcohol in South Africa

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THE DEMAND FOR ALCOHOL IN SOUTH AFRICA: PRICE AND INCOME RESPONSES FROM THE NATIONAL INCOME DYNAMICS STUDY

NON-TECHNICAL SUMMARY

Chapter 7 provided a summary of some of the methodological issues encountered when estimating the price elasticity and income elasticity of demand for alcohol. Two types of data are typically employed: time-series and cross-sectional. Both have advantages and drawbacks, but in recent years there has been rapid growth in the number of studies that have used cross-sectional data. In this chapter we also use cross-sectional data to estimate the price and income elasticities of demand for alcohol for South Africa.

In doing so, we make use of a method, developed by Angus Deaton of Princeton University, which exploits the empirical fact that at any point in time prices of goods and services vary across space. On average, the price of alcohol in cluster A (where a cluster can be thought of as a village, district or province) is different from the price of alcohol in cluster B. These price differences between clusters are attributed to transport costs and the fact that markets in most low- and middle-income countries are localised. The National Income Dynamic Study (NIDS) dataset is ideal for using Deaton's method because it collects data on the expenditure patterns of households and individuals within households for a host of commodities, including alcohol. The survey also collects an exhaustive list of household characteristics that influence the demand for alcohol, which allows us to control our price and income elasticity estimates for other factors.

Since the NIDS survey does not collect data on alcohol prices, we construct a measure of self-reported price by dividing household expenditure on alcohol by the quantity of alcohol consumed by all members of the household. This price measure is called the unit value. For instance, if a household reports having consumed 10 standard drinks in the previous month at a total expenditure of R100, then the unit value of alcohol for this household would be R10. However, the unit value is likely to be influenced by quality effects. Richer households will report higher expenditure on alcohol not because they are necessarily consuming larger quantities of alcohol but because they are purchasing alcohol of a higher quality i.e. at a higher unit value (or average price). Failure to account for this effect might understate the price elasticity of demand. For example, if the price increases and households trade down to a lower quality product (and consume broadly the same amount of that cheaper product), then the total consumption of alcohol in that household would remain the same. It would then seem that the quantity of alcohol consumed is not responsive to changes in price, but in effect the impact of the price change is felt in the quality of the beverage concerned. In other words, the demand for alcohol appears to be price inelastic, but this would be an illusion. Deaton's method accounts for these quality effects by doing the following: (1) checking the data for quality effects by seeing whether there is a positive relationship between self-reported prices and household income and (2) adjusting the estimated price elasticities for the quality effects.

We use NIDS's Wave 1 and Wave 3 data to present drinking prevalence estimates. Wave 1 was carried out in 2008 and incorporates 7301 households. Wave 3 was carried out in 2012 and incorporates 10 236 households. In estimating price and income elasticities, we present the results from Wave 1 data in the main text and present the results from Wave 3 in an appendix to this chapter.

We find that demand for alcohol in South Africa is, on average, price inelastic. For Wave 1, we estimate that the overall price elasticity of demand for alcohol is -0.52. That is, alcohol consumption declines by about 5%

for every 10% rise in alcohol prices. The income elasticity of demand for alcohol is estimated at 0.21, implying that alcohol consumption rises by about 2% for every 10% rise in household income. Both estimates of the price and income elasticities are in line with international literature. We subdivided the sample into two groups, based on the households' total expenditure on all goods and services (not only alcohol). Households with total expenditure less than the median were classified as poorer households, while households with total expenditure more than the median were classified as richer households. Poorer households' demand for alcohol is more responsive to price and income changes than that of richer households. Furthermore, our estimates show that light drinkers are more responsive to price and income changes than heavy drinkers. In other words, light drinkers are more likely to reduce consumption in the face of price increases and more likely to increase consumption in the face of income improvements than heavy drinkers.

A policy that targets the price of alcohol is likely to yield significant dividends in curbing alcohol demand. These effects are likely to be larger for poorer households than richer households, since the latter respond more to price changes than the former.

If the government wishes to use the excise tax as a tool to reduce alcohol consumption, it should ensure that increases in the excise tax increase the nominal price of alcohol by more than the inflation rate. If the real price stays constant over time, and average incomes are increasing, people would typically consume more alcohol. Thus the price should be adjusted in such a way that alcohol becomes less affordable over time.

The fact that light drinkers respond more to alcohol prices suggests that price/tax policies are likely to prevent light and medium drinkers from becoming heavy drinkers. On the other hand, our results show that, for heavy drinkers, a policy of targeting the price may not be sufficient on its own to curb alcohol demand.

1. INTRODUCTION

As highlighted in Chapter 7, the price of a good or service is the single most important predictor of demand. This is also true for products that are thought of as addictive, such as cigarettes and alcohol. A measure of the degree of responsiveness of demand to changes in price is the price elasticity of demand. As one would expect, knowing how demand responds to price is not only useful for the sellers of products, but also for policy makers. In designing alcohol control policy, especially one that seeks to control consumption via prices, a policymaker may want to know two things: (1) by how much will consumption decline if prices increase by certain amount and (2) will tax revenues decline in response to an increase in price? The price elasticity of demand adds a greater level of precision when providing answers to these questions.

This chapter uses the econometric method pioneered by Deaton (1988, 1989, 1990, 1992 and 1997), and applies it to household-level data generated in the first and third Waves of the National Income Dynamics Study (NIDS) to estimate the price elasticity of demand for alcohol in South Africa. A variety of household characteristics, such as household structure, household income and other demographic measures, allow us to control our price and income elasticity estimates for confounding factors.

Deaton's method exploits the spatial variation in price that is hypothesised to exist in low- and middle-income countries owing to transport costs and the existence of small localised markets. The latter makes the exploitation of arbitrage opportunities difficult and in this way allows us to isolate the effect of price on quantity demanded. Furthermore, the fact that each household is too small to affect the price of alcohol

implies that we need not concern ourselves with the problems of simultaneity bias that have plagued time-series studies based on aggregate variables. We explicitly test whether there is spatial variation in prices in our sample.

The rest of this chapter is structured as follows: section 2 provides a review of the relevant literature especially where Deaton's method is concerned; section 3 discusses the method; section 4 discusses the NIDS dataset; section 5 looks at some estimates of drinking prevalence from NIDS; section 6 presents the main econometric results and section 7 presents our conclusions.

2. LITERATURE REVIEW

There are generally two strands of literature on the estimation of the price elasticities of demand for alcohol. One strand uses aggregated time-series data and appropriate econometric techniques to estimate the effects of price on the demand for alcohol. The body of literature following this tradition is discussed in Chapter 7. A second strand of the literature uses household or individual level surveys to elicit the price response of alcohol consumption. Studies using this approach have been ably summarised in surveys by Chaloupka et al. (2002), Fogarty (2006), Gallet (2007) and Wagenaar et al. (2009). In general, the price and income elasticities (expressed in absolute values) from this second strand of literature tend to be higher than those obtained from using aggregated data.

As indicated in Chapter 7, studies using aggregated data and those using household/individual level data often encounter the problem of endogeneity, with the result that there is difficulty in pinning down the causal direction. This is more likely to be a problem with aggregated time-series data where aggregate variables on either the left-hand side or right-hand side of the estimation equation are simultaneously determined. For instance, the average alcohol price is determined by aggregate alcohol consumption and the average price, in turn, influences aggregate consumption. On the other hand, studies using household/individual level data often go around this problem by using instrumental variables, that is, variables that introduce exogenous variation in the right-hand side variables of interest. A list of studies using either approach is contained in the literature surveys referenced above.

A significant methodological contribution has been made by Deaton (1988, 1989, 1990, 1992 and 1997) to studies using household/individual level data to estimate price elasticities of demand. To the best of our knowledge, Deaton's method has not been used to estimate price elasticities for alcohol consumption, although a handful of studies have used the method for estimating the demand for tobacco (e.g. Guindon et al., 2011). Consequently, for illustrative purposes, we make reference to those studies in the tobacco literature that have used Deaton's method.

Deaton's method overcomes some of the problems with simultaneity bias (or reverse causality) found in the aggregate time-series studies because the self-reported demand for alcohol by each household is too small and insignificant to affect the price. Further, Deaton has shown that prices reported by individual households (what he refers to as unit values) have a great degree of spatial variation as one moves from one cluster to the next (where a cluster can either be a village, a district or a province) primarily because of localised markets and the presence of transport costs. This spatial variation in price delivers the exogenous variation that allows one to estimate demand responses. The sample sizes for these surveys usually number in the thousands and, if compared to time-series studies where, at best, one has 50 observations, allow for an estimation of a richer set of elasticities.

John (2008) used this method to estimate the price elasticity of bidis (an indigenous hand-rolled smoked tobacco), cigarettes and leaf tobacco in India using the 1999-2000 National Sample Survey which collected information on consumption and household characteristics for 120 000 households in over 10 000 villages. Recently Guindon et al. (2011) created a pooled dataset of a number of rounds of the Indian National Sample Survey and estimated own-price elasticities for bidis, cigarettes and leaf tobacco, and cross-price elasticities between these tobacco products and alcohol. Chen and Xing (2011) use data from China's Urban Household Income and Expenditure Survey (UHIES) to estimate own-price elasticities for urban households in China, using Deaton's method.

Deaton's method is not without its critics. Gibson and Rozelle (2004 and 2005) show that using unit values as a substitute for actual price yields biased estimators for the price elasticity even after correcting for quality and measurement error. In one study (Gibson and Rozelle, 2005) they compare price elasticity estimates from unit values with estimates from actual prices obtained from a market survey and alternative methods of eliciting price (such as showing respondents pictures of the commodity in question) and find that unit values bias the results. The criticisms notwithstanding, unit values present the most cost-effective way of saying something about the effect of price on demand. The alternative would be to conduct a detailed price survey (such as Gibson and Rozelle describe in their 2005 paper) for each commodity and map these prices to each household. If done properly, such an exercise would go a long way in addressing some of the biases in Deaton's method. But this would certainly be more costly than simply using Deaton's method.

3. METHOD

Deaton's method proceeds in a series of steps. In the first step, one calculates the unit value (or "price") faced by each household as the ratio of total expenditure to total quantity purchased for a particular commodity (alcohol in this case). We denote the variable so obtained as v_{hc}, where *h* represents the household and *c* is the cluster (village, district or province). Deaton hypothesises that the spatial variation in price is driven by transport costs and the isolated nature of markets in low- and middle-income countries. The implication of this is that households within the same cluster should face the same price (especially for narrowly defined clusters like villages) whereas unit valued ifferences should only exist between clusters. Any within-cluster variation in unit value should be due to measurement error. The final elasticities can be corrected for measurement error by exploiting the pattern of within-cluster measurement error, something that we do in our analysis below. The spatial variation hypothesis can be tested formally using Analysis of Variance (ANOVA) methods where unit values are regressed on a set of cluster dummies. The hypothesis of spatial variation is not rejected if the coefficients on the cluster dummies are jointly significant.

The next step is to check for quality effects by regressing the log of unit value on total household expenditure (a proxy for household income) because, presumably, high-income households buy higher quality products. One then needs to set up a regression of the form:

$$ln\, v_{hc} = \alpha^1 + \beta^1 ln x_{hc} + \gamma \boldsymbol{Z_{hc}} + u^1_{hc} \qquad (1)$$

Where x_{hc} is total household expenditure in household *h* in cluster *c* and $\boldsymbol{Z_{hc}}$ is a vector of household characteristics including household size, household structure (proportion of males and proportion of adults), a dummy variable for whether the household head is male and a dummy variable for whether the household head is married or has a partner. Other variables in $\boldsymbol{Z_{hc}}$ include the race of household head, educational level of household head and dummy variables for the geographic location of the household. If

β^1 is significant then quality effects are present in the unit values and the final estimates will have to be corrected for this. In other words, richer households buy products of better quality. Failure to correct for quality might bias the estimate of the price elasticity since a price change might simply result in a quality substitution as opposed to a quantity substitution. The fourth step involves an estimation of a "demand" equation of the form:

$$w_{hc} = \alpha^0 + \varepsilon_x ln x_{hc} + \delta \boldsymbol{Z_{hc}} + f_c + u_{hc}^0 \quad (2)$$

w_{hc} is the budget share of alcohol in total household expenditure in household *h* in cluster *c*. $\boldsymbol{Z_{hc}}$ is as defined above, f_c is a cluster-level fixed effect and u_{hc}^0 is the error. Equation (2) explains the demand for a commodity as being a function of household income, household characteristics and cluster fixed effects (to account for the fact that tastes might vary across clusters). Once the estimates for β^1 and ε_x have been obtained, the variables y_{hc}^0 and y_{hc}^1 are constructed in the following manner:

$$y_{hc}^0 = w_{hc} - \varepsilon_x ln x_{hc} - \delta \boldsymbol{Z_{hc}} \quad (3)$$

$$y_{hc}^1 = ln v_{hc} - \beta^1 ln x_{hc} - \gamma \boldsymbol{Z_{hc}} \quad (4)$$

Equations (3) and (4) are budget share and unit values "purged" of household expenditure and household characteristics. The purging is done to remove from the alcohol share and unit values the effects of household expenditure and household characteristics (recall that we are only interested in price and demand). Since we assume that prices are constant within clusters, price elasticities can only be estimated using the variation in average cluster demand (or average cluster share) and average cluster price. The expressions in (3) and (4) are therefore averaged for each cluster to obtain y_c^0 and y_c^1. (Note that the two expressions no longer carry the subscript *h* since they now represent cluster averages). Regressing y_c^0 (averaged cluster share) on y_c^1 (average cluster unit value) should deliver an estimate of the price elasticity of demand in the absence of quality effects.[1] Alternatively, the coefficient on y_c^1 can be obtained by taking the ratio of the covariance between y_c^0 and y_c^1 and the variance of y_c^1 to obtain ϕ, that is

$$\phi = \frac{Cov\left(y_c^0, y_c^1\right) - \frac{\sigma^{01}}{n_c}}{Var\left(y_c^1\right) - \frac{\sigma^{11}}{n_c}} \quad (5)$$

We opt for the latter approach since it allows us to correct for measurement error using σ^{01} and σ^{11}. σ^{01} is the covariance of the error terms in equations (1) and (2) and σ^{11} is the variance of error term in equation (1)[2]. n_c is the average cluster size in the sample. The intuition behind the measurement error correction is that measurement error becomes less of a problem as the cluster sample size grows large. Once an estimate of ϕ has been obtained, Deaton proposes the following set of formulas, based on a theory of quality that is articulated in Deaton (1997), to arrive at estimates of the price elasticity of demand, ε_P, and income elasticity of demand, ε_I, respectively:

$$\varepsilon_P = \left(\frac{\theta}{\bar{w}}\right) - \psi \quad (6)$$

$$\varepsilon_I = 1 + \left(\frac{\varepsilon_x}{\bar{w}}\right) - \beta^1 \quad (7)$$

[1] This is really a measure of how the share of alcohol in total household expenditure varies with price since the alcohol budget share is the dependent variable in the "demand" equation. The formulas that follow convert the estimate so obtained into a proper price elasticity of demand.

[2] σ^{11} and σ^{01} are estimated as follows:

$\sigma^{11} = \frac{u^{1\prime}u^1}{n-k-C-1}$ and $\sigma^{01} = \frac{u^{0\prime}u^1}{n-k-C-1}$, where u^1 and u^0 are the error terms in equations (1) and (2) respectively. n is the sample size, k is the number of parameters to be estimated and C is the number of clusters.

$\overline{w}$ is the mean expenditure share of the commodity of interest in the sample. ψ and θ are calculated as follows:

$$\psi = 1 - \frac{\beta^1(\overline{w} - \theta)}{\varepsilon_x + \overline{w}} \quad (8)$$

$$\theta = \frac{\phi}{1+(\overline{w} - \phi)\zeta} \quad (9) \text{ where}$$

$$\zeta = \frac{\beta^1}{\varepsilon_x + \overline{w}(1 - \beta^1)} \quad (10)$$

4. THE DATA

The data for this study primarily comes from Waves 1 and 3 of the National Income Dynamics Study (NIDS) conducted by the Southern Africa Labour and Development Research Unit (SALDRU) at the University of Cape Town. NIDS is a nationally representative household panel study that tracks individuals and households over time. We consider both Waves 1 and 3 when discussing drinking prevalence estimates below, but limit the econometric analysis in the main text to Wave 1 of NIDS.[3] We present the econometric results of Wave 3 in the Appendix, and refer to them tangentially in the main text.

The survey collects data on expenditure patterns of households and individuals within households for a host of commodities, including alcohol. The sample size in the inaugural survey (Wave 1) in 2008 was 7301 households and for Wave 3 in 2012 it was 10 236 households. For our purposes, a cluster is defined as the primary sampling unit, of which there were 400 in both waves. We drop from our analysis clusters that do not have a single household consuming alcohol. This brings our effective cluster sample sizes down to 323. Although NIDS contains individual level data on alcohol consumption, we conduct our analysis at the household level, because total expenditure on tobacco is collected at the household level. The recall period for NIDS is 30 days. We convert monthly expenditure to annual expenditure by multiplying by 12.

The econometric specifications in Section 3 are implemented on the full sample as well as different subsets of the data: types of expenditure groups (top 50% and bottom 50%) and types of drinkers (light and heavy drinking households). We use expenditure groups, rather than income groups, because it is a well-established finding that respondents to questionnaires are more truthful about their expenditures than their incomes. As a robustness check, we run specifications where we exclude unit values that exceed five standard deviations from the mean[4] and we also vary our definition of what constitutes a heavy-drinking household.

Table 1 provides summary statistics for all the variables used in our econometric analyses for Wave 1 (see Table A1 in the appendix for summary statistics for Wave 3).

[3] In the appendix we report results of our analysis for Wave 3, having treated it as a separate cross-section. The results for Wave 3, even though they are broadly in line with those of Wave 1, are not fully representative of the population. This is because Wave 3 was not a random sample of the population as it stood in 2012: Wave 3 is a sample of households who were sampled four years earlier in Wave 1. There is, therefore, a systematic pattern to the sample of households in Wave 3. In addition, there has been non-negligible attrition (compensated, on the other hand, by replacement) to the original Wave 1 sample. This introduces complications in terms of the econometric analysis that are beyond the scope of this study.

[4] Large unit values might be the product of measurement error or recall bias. Guindon et al. (2011) performed a similar sensitivity analysis where they removed unit values that were 5 standard deviations from the mean in their estimation of price elasticities of demand for tobacco products in India.

TABLE 1: SAMPLE SUMMARY STATISTICS, WAVE 1

	WAVE 1	
VARIABLE NAME	**Mean/Proportion**	**Standard Deviation**
Alcohol Budget Share	0.04	0.15
Unit Value	17.25	43.56
Log Unit Value	1.61	1.62
Household Expenditure	26 934.22	58 967.99
Log Household Expenditure	9.36	1.09
Household Size	4.11	2.79
Log Household Size	1.22	0.70
Proportion of Adults	0.65	
Proportion of Males	0.43	
Household Head Male	0.55	
Household Head Married or Partner	0.49	
Household Head Race:		
Black	0.76	
Coloured	0.14	
Asian and Indian	0.02	
White	0.08	
Household Head Education:		
No Schooling	0.22	
Primary Incomplete	0.21	
Primary Complete	0.08	
Secondary Incomplete	0.28	
Matric	0.19	
Tertiary Education	0.03	
Geographic Location:		
Rural Formal	0.12	
Tribal Authority Areas	0.36	
Urban (Formal and Informal)	0.52	
Number of Households	5950	
Number of Clusters	400	
Number of Effective Clusters	323	
Average Number of Households per Cluster	15	

Notes: Not weighted. Number of effective clusters refers to number of clusters with at least one household reporting positive expenditure on alcohol.

5. ALCOHOL PREVALENCE IN NIDS

Table 2 reports on the prevalence estimates from the NIDS dataset for drinking across different social, economic, demographic and geographic characteristics of households. The table also provides estimates of the prevalence of different types of drinking, based on the definitions. In Table 2, heavy drinking is set at 730 standard drinks per annum (i.e. an average of two drinks per day or 14 drinks per week), for the heaviest drinker in the household, for Waves 1 and 3. Tables A2 and A3 in the appendix report on the prevalence of drinking if the cut-off for heavy drinking is set at 1095 standard drinks for the heaviest drinker in the

household (i.e. 3 drinks per day or 21 drinks per week) and 547.5 standard drinks for the heaviest drinker in the household (i.e. 1.5 drinks per day or 10.5 drinks per week), respectively. The estimates in Table 2 and the two tables in the appendix are weighted and therefore nationally representative.

The prevalence percentages presented in Table 2 are not directly comparable to the analysis of prevalence that was performed in Chapter 2. In the first place, the AMPS data on which Chapter 2 was based were collected at the individual level, whereas the data presented in Table 2 are at the household level. Thus even if only one person in a household consumes alcohol, while nobody else does, that household will be classified as a "drinking household." Secondly, the recall period for the AMPS data is one week, whereas for the NIDS data it is one month. Thirdly, the AMPS data consider prevalence for individual products, whereas NIDS asks whether the respondent consumes alcohol, without asking the detail about the type of product being consumed.

TABLE 2: DRINKING PREVALENCE ACROSS DIFFERENT GROUPS, WAVE 1 AND WAVE 3

		WAVE 1						WAVE 3					
		Do Not Drink	Drink	% of Drinkers who are Light Drinkers	% of Drinkers who are Heavy Drinkers	% of Total who are Light Drinkers	% of Total who are Heavy Drinkers	Do Not Drink	Drink	% of Drinkers who are Light Drinkers	% of Drinkers who are Heavy Drinkers	% of Total who are Light Drinkers	% of Total who are Heavy Drinkers
Race	Black	64%	36%	77%	23%	28%	8%	64%	36%	76%	24%	27%	9%
	Coloured	48%	52%	76%	24%	39%	12%	41%	59%	75%	25%	44%	15%
	Asian & Indian	51%	49%	71%	29%	35%	14%	56%	44%	88%	12%	39%	5%
	White	33%	67%	80%	20%	54%	13%	37%	63%	91%	9%	58%	6%
Religion	None	42%	58%	69%	31%	40%	18%	44%	56%	79%	21%	44%	12%
	Christian	59%	41%	79%	21%	33%	9%	60%	40%	79%	21%	32%	9%
	Muslim	83%	17%	92%	8%	15%	1%	89%	11%	85%	15%	9%	2%
	African	61%	39%	71%	29%	28%	12%	64%	36%	72%	28%	26%	10%
	Other	32%	68%	77%	23%	52%	16%	46%	54%	82%	18%	45%	10%
Province	Western Cape	45%	55%	70%	30%	38%	16%	46%	54%	79%	21%	43%	11%
	Eastern Cape	67%	33%	74%	26%	24%	9%	68%	32%	81%	19%	26%	6%
	Northern Cape	40%	60%	78%	22%	47%	13%	47%	53%	76%	24%	40%	13%
	Free State	52%	48%	79%	21%	38%	10%	52%	48%	73%	27%	35%	13%
	KwaZulu-Natal	59%	41%	73%	27%	30%	11%	66%	34%	83%	17%	28%	6%
	North West	55%	45%	75%	25%	34%	11%	57%	43%	72%	28%	30%	12%
	Gauteng	59%	41%	81%	19%	34%	8%	56%	44%	80%	20%	35%	9%
	Mpumalanga	59%	41%	83%	17%	34%	7%	63%	37%	76%	24%	28%	9%
	Limpopo	74%	26%	87%	13%	23%	3%	64%	36%	79%	21%	28%	8%
Expenditure Quintiles	1	67%	33%	76%	24%	25%	8%	68%	32%	75%	25%	24%	8%
	2	66%	34%	81%	19%	28%	6%	64%	36%	75%	25%	27%	9%
	3	63%	37%	71%	29%	26%	11%	63%	37%	74%	26%	27%	9%
	4	59%	41%	77%	23%	32%	10%	54%	46%	81%	19%	37%	8%
	5	40%	60%	82%	18%	49%	11%	46%	54%	85%	15%	46%	8%

Notes: The race and religion variables refer to the race and religion of the household head. The province and expenditure variables are household level variables. All results are weighted. A household is assigned "Heavy" drinking status if the heaviest drinker in the household consumes more than 547.5 standard drinks per annum.

In terms of race, Table 2 shows that White households in 2008 had the highest prevalence of drinking, with 67% of White households reporting positive expenditure on alcohol in the previous month, followed by Coloured households with 52%. Black households had the lowest drinking prevalence at 36%. These prevalence estimates and patterns do not change substantially between Wave 1 and Wave 3 of NIDS. The White and Black prevalence estimates in Wave 3 were 63% and 36% respectively. In terms of religion, the lowest prevalence of drinking is found among Muslim households in both Waves 1 and 3 at 17% and 11% respectively. The highest prevalence estimates in this category are among those households that indicate their religion as "other," followed by people with no religious affiliation.

In terms of provincial estimates, in 2008 the Northern Cape had the highest drinking prevalence at 60% of all households, followed by the Western Cape (55%) and the Free State (48%). The lowest estimate for drinking prevalence was for Limpopo province with 26% of all households reporting positive expenditure on alcohol. For Wave 3 the estimates changed slightly, with the Western Cape recording a higher percentage of drinking households than the Northern Cape at 54% and 53% respectively. The province with the lowest prevalence was the Eastern Cape at 32%, with Limpopo second from the bottom at 36%.

In terms of expenditure groups, the lowest expenditure quintile (or the bottom 20% of all households in terms of household expenditure) had the lowest prevalence of drinking in both Waves 1 and 3 at 32% and 33% respectively. As one would expect, the top 20% of all households (quintile 5) had the highest drinking prevalence at 60% for Wave 1 and 54% for Wave 3.

Table 2 shows that most South African households that drink alcohol drink less than the (arbitrary) threshold annual quantity. However, this definition of drinking does not consider the pattern of drinking. For example, a person who has two glasses of wine a night is classified in the same category as a person who does not drink during the week, but who drinks 14 drinks on a Saturday night. Using the first definition (with a cut-off of 547.5 standard drinks per annum), 23% of all Black households that drink were heavy drinkers, while 77% of Black drinking households were light drinkers. For Coloureds, Asian/Indians and Whites, the percentages of heavy drinkers among drinkers were 24%, 29% and 20% respectively. In other words, using this definition, Asians/Indians had the highest percentage of drinkers who were heavy drinkers.

This pattern filters through when one looks at all households: Asian/Indian households had the highest percentage of all households that report heavy drinking at 14% (although this percentage is based on a small sample of respondents), followed by White households at 13% and Coloured households at 12%. Black households had the lowest heavy drinking prevalence at 8%.

6. ECONOMETRIC RESULTS

As mentioned earlier, the crucial hypothesis that Deaton (1988, 1989, 1990, 1992 and 1997) relies on in estimating price elasticities is that unit values (or prices) vary spatially. This hypothesis can be tested using Analysis of Variance (ANOVA) methods that decompose the total variation in unit values to "within cluster" and "between cluster" sources of variation. A large F-statistic in this type of decomposition implies that the hypothesis of spatially equal prices is rejected. We would accept the alternative hypothesis that prices are spatially dissimilar or varying. Alternatively, one can run a regression of the logarithm of unit values on cluster dummies. If the cluster dummies are jointly significant, then the hypothesis of spatially varying prices is not rejected. Table A4 in the appendix shows the results of the ANOVA exercise on Wave 1 (we also report the results for Wave 3 in Table A4). The ANOVA exercise is performed on the two data specifications to check for robustness: specification (1) considers the entire sample, specification (2)

excludes unit values that are greater than 5 standard deviations from the mean. The hypothesis of spatially equal prices is rejected in all specifications. Thus we are confident that, in our demand equations, price differs by cluster. Furthermore, given that any individual household has a negligible impact on aggregate consumption or income, our price and income elasticity estimates are unlikely to be affected by endogeneity concerns.

Tables A5 in the appendix provides results from our estimations of the first-stage regressions, equations (1) and (2). The estimations are done over the two data specifications as described above (we also report results for Wave 3). The elasticity of unit value with respect to household income is statistically significant and approximately equal to 0.2 in all the data specifications. The unit value (or price) faced by a household increases by 0.2% whenever household expenditure increases by 1%. In other words, "richer" households buy alcohol at higher prices, with the implication that there are quality differences in the types of alcohol consumed by different households in the survey. In estimating the price elasticity of demand, we ought to take cognisance of this fact, as we do below. There are also interesting alcohol quality patterns with regard to education and race: relative to households where the head of house has no education, households where the head has done secondary schooling or higher report higher unit values. For race, White and Asian/Indian households report higher unit values relative to Black households.

Further, Table A5 shows that households' allocation to alcohol, expressed as a percentage of total household expenditure, declines with total household expenditure (see the first row in the table). This is true for the two data specifications. However, compared to households where the head has no education, households headed by matric and college graduates are likely to allocate more of their total expenditure to alcohol. This is partly accounted for by the fact that such households are likely to buy alcohol of a higher quality which costs more (asmentioned in the previous paragraph).

We then construct y_{hc}^0 and y_{hc}^1 according to equations (3) and (4). These are averaged across clusters to obtain y_c^0 and y_c^1, which are average cluster budget share and average cluster unit value respectively, stripped of total household expenditure and other household characteristics. We then obtain $\hat{\phi}$, an estimate of ϕ, as the ratio of the covariance between y_c^0 and y_c^1 and the variance of y_c^1 corrected for measurement error according to equation (5). We do not report the results of this exercise but they are available on request from the authors.

We can now use our estimates of β^1 and ε_x from Table A5, together with our estimates of ϕ, to construct ζ, θ and ψ according to equations (10), (9) and (8) respectively. The latter two are then used to calculate estimates of the price elasticity of demand for alcohol according to equation (6). The income elasticity of demand for alcohol is calculated using equation (7) and its inputs are only the first stage estimates of β^1 and ε_x. We use the bootstrap technique (Deaton, 1997) with a thousand replications to obtain standard errors for our price and income elasticity estimates.[5]

The first set of elasticity estimates is reported in Table 3 for Wave 1 (and Table A6 for Wave 3). The table reports estimates for the two data specifications alluded to earlier. Looking at the top panel of Table 3, the price elasticity of demand for alcohol for the full sample specification is -0.52. The income elasticity of demand (also for the full sample) is reported in the bottom panel and is estimated at 0.22. The price elasticity estimate is statistically significant at 1% and the income elasticity estimate at 5%. The price elasticity estimate implies that a 1% rise in prices results in alcohol consumption, on average, declining by

[5] Each round of the bootstrap draws one thousand samples of size *n* and derives a probability distribution of elasticity estimates for the 1000 samples. The standard error is also computed during the bootstrap. The combination of the two allows us to build confidence intervals for our elasticity estimates.

0.52%. The income elasticity estimate implies that a 1% rise in household income results in a 0.22% rise in alcohol consumption on average. These elasticity estimates are robust to excluding large unit values (see column (2) in the top and bottom panels of the table). Similar elasticity estimates are obtained for Wave 3; these results are reported in the appendix in Table A6.

TABLE 3: PRICE ELASTICITY OF DEMAND (ε_P) AND INCOME ELASTICITY OF DEMAND (ε_I) ESTIMATES, WAVE 1

	PRICE ELASTICITY			
	(1)		(2)	
	ε_P	95% Confidence Interval	ε_P	95% Confidence Interval
Coefficient	-0.5156***	(-0.5436, -0.4876)	-0.5158***	(-0.5450, -0.4866)
Standard Error	[0.0143]		[0.0148]	
Observations	323		323	
	INCOME ELASTICITY			
	(1)		**(2)**	
	ε_I	95% Confidence Interval	ε_I	95% Confidence Interval
Coefficient	0.2184**	(0.0077, 0.4291)	0.2157**	(-0.001, 0.4325)
Standard Error	[0.1074]		[0.1106]	
Observations	4668		4662	

*Notes:**, and *** refer to statistical significance at 5% and 1% levels respectively. Bootstrapped standard errors are in square parentheses. Specification (1) looks at the full sample and (2) considers only unit values that are less than 5 standard deviations from the mean. The number of observations for the income elasticity estimates is greater than those for the price elasticity estimates since the former is estimated at the household level whereas the latter is estimated at the cluster level.*

The elasticity estimates presented in Table 3 represent average effects. Some subsets of the population are likely to respond differently to price changes and/or income changes depending on income status or drinking status of a household. The rest of the tables presented in this chapter attempt to quantify these different response rates, if there are any.

Table 4 presents elasticity estimates for two subsets of the population, the top 50% and bottom 50% of households by total household expenditure for Wave 1 (Wave 3 results are reported in Table A7 in the appendix). In the top panel of Table 4 the price elasticity of demand for alcohol for the top 50% of households in the full sample is -0.54. This estimate is significant at the 1% level. The income elasticity of demand for this group (also for the full sample) is estimated at 0.17. The income elasticity is not statistically different from zero. For the bottom 50%, the price elasticity is -0.86 and the income elasticity is 0.40. The price elasticity estimate is statistically significant at 1% and income elasticity estimate is statistically significant at 10%. These estimates are robust to the exclusion of large unit values as reported in the second row of both panels in Table 4.[6]

[6] The observant reader would notice that the "average" of the price elasticity estimates of the top 50% and bottom 50% of households differs quite significantly from the price elasticity obtained from the whole sample. In fact, the two price elasticity estimates in Table 4 do not straddle the price estimate for the whole population in Table 3. This distressed us, and we investigated this in detail to ensure that it was not driven by a coding error. We are confident that it is not. The best explanation that we can present is that the two samples in Table 4 have very different statistical characteristics (e.g. measures of central tendency and dispersion) than the sample in Table 3, and that, as a result, the elasticity estimates of the two tables are not directly comparable. We are not alone with this predicament. Guindon, et al. (2011), in a working paper published by the National Bureau of Economic Research (NBER), also found that price elasticity estimates for different subsamples did not straddle the price elasticity estimate for the whole sample.

The overall implication of the results reported in Table 4 is that poorer households (at least as measured by household expenditure) respond more to price and income changes than do richer households, something that accords with our a priori expectations. For Wave 3 (reported in Table A6 in the appendix) we find results that are quantitatively different but qualititatively similar to Wave 1 at least for price changes: the bottom 50% of households respond more to price changes than the top 50%. As discussed in some detail in footnote (5), one possible explanation for the quantitative differences in the estimates between the two waves, especially so for sub-samples of the data, is that Wave 3 was not a fully representative sample of South African households in 2012.

TABLE 4: PRICE ELASTICITY OF DEMAND (ε_P) AND INCOME ELASTICITY OF DEMAND (ε_I) ESTIMATES BY EXPENDITURE TYPE, WAVE 1

	PRICE ELASTICITY					
	TOP 50%			**BOTTOM 50%**		
	ε_P	**Confidence Interval**	**n**	ε_P	**Confidence Interval**	**n**
Specification (1)	-0.5438*** [0.0645]	(-0.6700, -0.4174)	320	-0.8629*** [0.1174]	(-1.0930, -0.6327)	317
Specification (2)	-0.5613*** [0.0444]	(-0.6484, -0.4743)	320	-0.8629*** [0.1174]	(-1.0930,-0.6328)	317
	INCOME ELASTICITY					
	TOP 50%			**BOTTOM 50%**		
	ε_I	**Confidence Interval**	**n**	ε_I	**Confidence Interval**	**n**
Specification (1)	0.1712 [0.2058]	(-0.2322, 0.5745)	2238	0.3996* [0.2209]	(-0.0334, 0.8326)	2430
Specification (2)	0.1866 [0.2019]	(-0.2091, 0.5823)	2232	0.3996* [0.2209]	(-0.0334,0.8326)	2430

*Notes: *,**, and *** refer to statistical significance at 10%, 5% and 1% levels respectively. Bootstrapped standard errors are in square parentheses. Specification (1) looks at the full sample and (2) considers only unit values that are less than 5 standard deviations from the mean. The number of observations for the income elasticity estimates are greater than those for the price elasticity estimates since the former is estimated at the household level whereas the latter is estimated at the cluster level. n is the number of observations.*

Table 5 presents estimates of the price and income elasticities by type of drinker for Wave 1 (Wave 3 results are reported in Table A8). For our base-level estimation, we classify a household as a heavy-drinking household if total household alcohol consumption is greater than 730 standard drinks per annum (or an average of two standard drinks per day). As a robustness check, we classify households as heavy-drinking households if total household alcohol consumption is greater than 1095 standard drinks per annum (or 3 standard drinks per day). This way of classifying households into drinking category differs from the approach used in section 5 of this chapter since the econometric analysis is conducted at the household level (i.e. unit values are only defined at the household level) whereas the prevalence estimates in section 5 are at the individual level. We also check for robustness by excluding large unit values.

In specification (1) in Table 5, which is the full sample using a cut-off of 730 standard drinks per annum, the price elasticity of demand for light drinkers is -0.56 while the income elasticity is 0.28; both estimates are statistically significant at 1%. For heavy drinkers, the price and income elasticities are respectively equal to -0.28 and 0.17. The price elasticity is significant at 1% while the income elasticity is not statistically different

from zero. The results are similar in specification (2) which excludes large unit values. Repeating the exercise using the 1095 standard drinks cut-off returns similar results (row (3) in the top and bottom panels); that is, light drinkers respond more to income and price changes than heavy-drinking households. These results are also robust to the exclusion of large unit values. The Wave 3 results (reported in Table A8 and only using the 730 drinks per annum cut-off) are qualitatively similar to those for Wave 1.

TABLE 5: PRICE ELASTICITY OF DEMAND (ε_P) AND INCOME ELASTICITY OF DEMAND (ε_I) ESTIMATES BY TYPE OF DRINKER, WAVE 1

	PRICE ELASTICITY					
	HEAVY DRINKERS			**LIGHT DRINKERS**		
	ε_P	**Confidence Interval**	**n**	ε_P	**Confidence Interval**	**n**
Specification (1)	-0.2792*** [0.0041]	(-0.2872, -0.2712)	218	-0.5597*** [0.0291]	(-6167, -0.5027)	323
Specification (2)	-0.2792*** [0.041]	(-0.2782, -0.2712)	218	-0.5584*** [0.0314]	(-0.6199,-0.4970)	323
Specification (3)	-0.2652*** [0.0391]	(-0.3417, -0.1886)	177	-0.6099*** [0.0276]	(-0.6641, -0.5557)	323
Specification (4)	-0.2652*** [0.0391]	(-0.3417, -0.1886)	177	-0.6107*** [0.0297]	(-0.6688, -0.5526)	323
	INCOME ELASTICITY					
	HEAVY DRINKERS			**LIGHT DRINKERS**		
	ε_I	**Confidence Interval**	**n**	ε_I	**Confidence Interval**	**n**
Specification (1)	0.1680 [0.2577]	(-0.3371, 0.6731)	363	0.2812*** [0.0987]	(0.0878, 0.4746)	4305
Specification (2)	0.1680 [0.2577]	(-0.3371, 0.6731)	363	0.2787*** [0.1018]	(0.0792,0.4783)	4299
Specification (3)	0.2282 [0.3270]	(-0.4128, 0.8692)	231	0.3092*** [0.0942]	(0.1246, 0.4937)	4437
Specification (4)	0.2282 [0.3270]	(-0.4128, 0.8692)	231	0.3069***	(0.1264, 0.4874)	4431

*Notes: *,**, and *** refer to statistical significance at 10%, 5% and 1% levels respectively. Bootstrapped standard errors are in square parentheses. Specification (1) looks at the full sample using a drinker-type cut-off of 730 standard drinks per annum and (2) excludes unit values values greater than 5 standard deviations from the mean but still considering a drinker-type cut-off of 730 standard drinks per annum. Specification (3) looks at the full sample using a drinker-type cut-off of 1095 standard drinks per annum and (4) excludes unit values greater than 5 standard deviations from the mean but still using a drinker-type cut-off of 1095 standard drinks per annum. The number of observations for the income elasticity estimates are greater than those for the price elasticity estimates since the former is estimated at the household level whereas the latter is estimated at the cluster level. n is the number of observations.*

The message from Table 5 is that light-drinking households are more responsive to income and price changes than heavy drinking households and this finding is robust to different data specifications. One explanation for this finding is that heavy drinkers are more likely to be addicted and are consuming alcohol at an "optimal" level, relative to their addiction, and are thus much less responsive to price and income changes than moderate, non-addicted users.

7. SUMMARY AND CONCLUDING REMARKS

Using the method pioneered by Deaton and data from the National Income Dynamics Study (NIDS), this chapter has estimated the price and income elasticities of demand for alcohol in South Africa. We have found that the demand for alcohol is price inelastic, which accords with findings in international literature. That is, the percentage decline in alcohol consumption is proportionately less than the percentage increase in alcohol prices. Specifically we found that for Wave 1, the overall price elasticity was estimated at -0.52. In terms of interpretation, the quantity demanded of alcohol is likely to decline by about 5% whenever prices rise by 10%. In addition, our estimates show that changes in household resources (measured by means of total household expenditure) drive alcohol consumption. Specifically we find that a 10% increase in household income is likely to translate into a 2% increase in alcohol consumption. These elasticity estimates are robust to different specifications of the data. Further, the study has shown that different subsets of the population have different response patterns to changes in alcohol prices and income. For instance, we find that poor households respond more to price and income changes than rich households. Further, we find that light-drinking households respond more to price and income changes than heavy-drinking households.

In terms of policy implications, the findings in this chapter suggest that a policy that targets the price of alcohol is likely to have significant effects in curbing alcohol demand. These effects are likely to be greater for poorer households than for richer ones, since the former respond more to price changes than the latter.

If the government wishes to use the excise tax as a tool to reduce alcohol consumption, it should ensure that increases in the excise tax increase the nominal price of alcohol by more than the inflation rate. If the real price stays constant over time, and average incomes are increasing, people would typically consume more alcohol. Thus the price should be adjusted in such a way that alcohol becomes less affordable over time.

The findings in this study, especially the fact that light drinkers respond more to alcohol prices, suggest that price/tax policies are likely to prevent light and medium drinkers from becoming heavy drinkers. On the other hand, our results show that for heavy drinkers, a policy of targeting the price may not be sufficient on its own to curb alcohol demand.

REFERENCES

Chaloupka, F.J., Grossman, M. and Saffer, H. 2002. "The effects of price on alcohol consumption and alcohol-related problems." *Alcohol Research and Health* 26(1):22 – 34.

Chen, Y and Xing, W, 2011. "Quantity, quality, and regional price variation of cigarettes: Demand analysis based on a household survey in China". *China Economic Review*, 22(2): 221 – 232

Deaton, A, 1988. "Quality, Quantity, and Spatial Variation of Price". *The American Economic Review*. 78(3):418-30

Deaton, A, 1989. "Household Survey Data and Pricing Policies in Developing Countries". *World Bank Economic Review*. 3(2):183–210.

Deaton, A, 1990. "Price elasticities from survey data: extensions and Indonesian results". *Journal of Econometrics*. 44(3):281-309.

Deaton, A and Grimard, F, 1992. "Demand analysis for tax reform in Pakistan*". LSMS Working Paper* 85. Washington: The World Bank.

Deaton, A, 1997. *Analysis of household surveys*. Baltimore: Johns Hopkins University Press on behalf of the World Bank.

Fogarty, J. 2006. "The nature of the demand for alcohol: Understanding elasticity". *British Food Journal*, 108: 316-332, 2006.

Frisch, R and Waugh, F.V, 1933. "Partial time regressions as compared with individual trends". *Econometrica*, 1(4): 387 – 401.

Gallet, C.A. 2007. "The demand for alcohol: A meta-analysis of elasticities". *Australian Journal of Agricultural and Resource Economics,* 51: 121-135.

Gibson, J and Rozelle, S, 2004. "An empirical test of methods for estimating price elasticities from household survey data". University of Waikato working paper.

Gibson, J and Rozelle, S, 2005. "Prices and unit values in poverty measurement and tax reform analysis". *World Bank Economic Review*, 19(1): 69 – 97

Guindon, E.G., Nandi, A, Chaloupka, F and Jha, P, 2011. "Socioeconomic differences in the impact of smoking tobacco and alcohol prices on smoking in India". NBER Working Paper Series, WP 17580.

John, R.M., 2008. "Price elasticity estimates for tobacco products in India". *Health Policy and Planning*, 23: 200 – 209

Lance, P, Akin, J, Dow, W and Loh, C, 2004. "Is cigarette smoking in poorer nations highly sensitive to price? Evidence from Russia and China". *Journal of Health Economics*, 23: 173 – 189

Leung, S.F. and Phelps, C.E. 1993. "My kingdom for a drink…? A review of estimates of the price sensitivity of demand for alcoholic beverages." In Hilton, M.E., and Bloss, G., Eds. *Economics and the Prevention of Alcohol-Related Problems.* National Institute on Alcohol Abuse and Alcoholism Research Monograph No. 25, NIH Publication No. 93-513. Rockville, MD: National Institute on Alcohol and Alcoholism.

Wagenaar, A.C., Salois, M.J. and Komro. K.A. 2009. "Effects of beverage alcohol price and tax levels on drinking: A meta-analysis of 1003 estimates from 112 studies". *Addiction,* 104(2): 179-190.

APPENDIX

TABLE A1: SAMPLE SUMMARY STATISTICS, WAVE 3

	WAVE 3	
VARIABLE NAME	**Mean/Proportion**	**Standard Deviation**
Alcohol Budget Share	0.04	0.13
Unit Value	25.15	48.09
Log Unit Value	2.18	1.54
Household Expenditure	125 869.8	7 200 000
Log Household Expenditure	9.74	0.94
Household Size	4.17	2.81
Log Household Size	1.20	0.71
Proportion of Adults	0.67	
Proportion of Males	0.41	
Household Head Male	0.38	
Household Head Married or Partnered	0.41	
Household Head Race:		
Black	0.82	
Coloured	0.13	
Asian and Indian	0.01	
White	0.04	
Household Head Education:		
No Schooling	0.15	
Primary Incomplete	0.18	
Primary Complete	0.08	
Secondary Incomplete	0.34	
Matric	0.22	
Tertiary Education	0.03	
Geographic Location:		
Rural Formal	0.12	
Tribal Authority Areas	0.36	
Urban (Formal and Informal)	0.52	
Number of Households	5950	
Number of Clusters	400	
Number of Effective Clusters	323	
Average Number of Households per Cluster	15	

Notes: Not weighted. Number of effective clusters refers to the number of clusters with at least one household reporting positive expenditures on alcohol.

TABLE A2: DRINKING PREVALENCE ACROSS DIFFERENT GROUPS, WAVE 1 AND WAVE 3

		WAVE 1						WAVE 3					
		Do Not Drink	Drink	% of Drinkers who are 'Light' Drinkers	% of Drinkers who are 'Heavy' Drinkers	% of Total who are 'Light' Drinkers	% of Total who are 'Heavy' Drinkers	Do Not Drink	Drink	% of Drinkers who are 'Light' Drinkers	% of Drinkers who are 'Heavy' Drinkers	% of Total who are 'Light' Drinkers	% of Total who are 'Heavy' Drinkers
Race	Black	64%	36%	83%	17%	30%	6%	64%	36%	81%	19%	29%	7%
	Coloured	48%	52%	82%	18%	42%	9%	41%	59%	82%	18%	48%	11%
	Asian & Indian	51%	49%	72%	28%	35%	14%	56%	44%	94%	6%	42%	2%
	White	33%	67%	91%	9%	61%	6%	37%	63%	96%	4%	61%	3%
Religion	None	42%	58%	75%	25%	44%	15%	44%	56%	83%	17%	47%	9%
	Christian	59%	41%	86%	14%	36%	6%	60%	40%	84%	16%	34%	6%
	Muslim	83%	17%	92%	8%	15%	1%	89%	11%	85%	15%	9%	2%
	African	61%	39%	85%	15%	34%	6%	64%	36%	74%	26%	27%	9%
	Other	32%	68%	82%	18%	56%	12%	46%	54%	91%	9%	49%	5%
Province	Western Cape	45%	55%	84%	16%	46%	9%	46%	54%	87%	13%	47%	7%
	Eastern Cape	67%	33%	81%	19%	27%	6%	68%	32%	86%	14%	27%	4%
	Northern Cape	40%	60%	86%	14%	52%	8%	47%	53%	80%	20%	42%	11%
	Free State	52%	48%	85%	15%	40%	7%	52%	48%	78%	22%	38%	11%
	KwaZulu-Natal	59%	41%	80%	20%	33%	8%	66%	34%	88%	12%	30%	4%
	North West	55%	45%	77%	23%	34%	10%	57%	43%	78%	22%	33%	9%
	Gauteng	59%	41%	87%	13%	36%	5%	56%	44%	83%	17%	37%	7%
	Mpumalanga	59%	41%	87%	13%	36%	5%	63%	37%	86%	14%	32%	5%
	Limpopo	74%	26%	91%	9%	24%	2%	64%	36%	81%	19%	29%	7%
Expenditure Quintiles	1	67%	33%	83%	17%	28%	6%	68%	32%	78%	22%	25%	7%
	2	66%	34%	86%	14%	29%	5%	64%	36%	82%	18%	29%	7%
	3	63%	37%	78%	22%	29%	8%	63%	37%	79%	21%	29%	8%
	4	59%	41%	84%	16%	35%	7%	54%	46%	87%	13%	40%	6%
	5	40%	60%	87%	13%	52%	8%	46%	54%	90%	10%	49%	6%

Notes: The race and religion variables refer to the race and religion of the household head. The province and expenditure variables are household level variables. All results are weighted. A household is assigned "Heavy" drinking status if the heaviest drinker in the household consumes more than 730 standard drinks per annum.

TABLE A3: DRINKING PREVALENCE ACROSS DIFFERENT GROUPS, WAVE 1 AND WAVE 3

		WAVE 1						WAVE 3					
		Do Not Drink	Drink	% of Drinkers who are 'Light' Drinkers	% of Drinkers who are 'Heavy' Drinkers	% of Total who are 'Light' Drinkers	% of Total who are 'Heavy' Drinkers	Do Not Drink	Drink	% of Drinkers who are 'Light' Drinkers	% of Drinkers who are 'Heavy' Drinkers	% of Total who are 'Light' Drinkers	% of Total who are 'Heavy' Drinkers
Race	Black	64%	36%	89%	11%	32%	4%	64%	36%	88%	12%	32%	4%
	Coloured	48%	52%	92%	8%	48%	4%	41%	59%	88%	12%	52%	7%
	Asian & Indian	51%	49%	72%	28%	35%	14%	56%	44%	94%	6%	42%	2%
	White	33%	67%	93%	7%	63%	5%	37%	63%	99%	1%	62%	1%
Religion	None	42%	58%	83%	17%	48%	10%	44%	56%	90%	10%	50%	6%
	Christian	59%	41%	91%	9%	38%	4%	60%	40%	90%	10%	36%	4%
	Muslim	83%	17%	92%	8%	15%	1%	89%	11%	85%	15%	9%	2%
	African	61%	39%	93%	7%	37%	3%	64%	36%	87%	13%	32%	5%
	Other	32%	68%	82%	18%	56%	12%	46%	54%	91%	9%	49%	5%
Province	Western Cape	45%	55%	90%	10%	49%	5%	46%	54%	91%	9%	49%	5%
	Eastern Cape	67%	33%	88%	12%	29%	4%	68%	32%	92%	8%	29%	3%
	Northern Cape	40%	60%	91%	9%	54%	6%	47%	53%	88%	12%	47%	7%
	Free State	52%	48%	90%	10%	43%	5%	52%	48%	83%	17%	40%	8%
	KwaZulu-Natal	59%	41%	84%	16%	35%	6%	66%	34%	94%	6%	32%	2%
	North West	55%	45%	80%	20%	36%	9%	57%	43%	84%	16%	36%	7%
	Gauteng	59%	41%	93%	7%	38%	3%	56%	44%	90%	10%	40%	4%
	Mpumalanga	59%	41%	93%	7%	38%	3%	63%	37%	94%	6%	35%	2%
	Limpopo	74%	26%	94%	6%	25%	2%	64%	36%	88%	12%	31%	4%
Expenditure Quintiles	1	67%	33%	87%	13%	29%	4%	68%	32%	85%	15%	27%	5%
	2	66%	34%	90%	10%	31%	3%	64%	36%	88%	12%	32%	4%
	3	63%	37%	88%	12%	32%	4%	63%	37%	87%	13%	32%	5%
	4	59%	41%	92%	8%	38%	3%	54%	46%	92%	8%	42%	4%
	5	40%	60%	89%	11%	53%	7%	46%	54%	95%	5%	51%	3%

Notes: The race and religion variables refer to the race and religion of the household head. The province and expenditure variables are household level variables. All results are weighted. A household is assigned "Heavy" drinking status if the heaviest drinker in the household consumes more than 1095 standard drinks per annum.

TABLE A4: ANOVA RESULTS FOR SPATIAL VARIATION HYPOTHESIS, WAVE 1 AND WAVE 3

	WAVE ONE								WAVE 3							
	Specification (1)				Specification (2)				Specification (1)				Specification (2)			
	Sum of Squares	DF	MS	F	Sum of Squares	DF	MS	F	Sum of Squares	DF	MS	F	Sum of Squares	DF	MS	F
Cluster	1279.64	322	3.97	1.87 ***	1221.37	321	3.80	1.84 ***	1162.56	355	3.27	1.55 ***	1097.21	351	3.09	1.50 ***
Error	1877.07	884	2.12		1818.43	879	2.07		2784.38	1315	2.12		2676.38	1243	2.05	
Total	3156.71	1206	2.61		3039.80	1200	2.53		3946.94	1670	2.36		3773.59	1658	2.27	
Observations	1207				1201				1671				1659			

Notes: The ANOVA is performed to test the hypothesis of spatial variation in unit values. The hypothesis is not rejected in all four specifications for both waves because the F statistics are "large". Specification (1) looks at the full sample and (2) considers only unit values that are less than or equal to 100.

TABLE A5: REGRESSION RESULTS FOR THE UNIT VALUE EQUATION (EQUATION 1) AND SHARE EQUATION (EQUATION 2), WAVE 1 AND WAVE 3

	WAVE 1				WAVE 3			
	Specification (1)		Specification (2)		Specification (3)		Specification (4)	
DEPENDENT VARIABLE	**Log Unit Value**	**Alcohol Share (w)**	**Log Unit Value**	**Alcohol Share (w)**	**Log Unit Value**	**Alcohol Share (w)**	**Log Unit Value**	**Alcohol Share (w)**
Log Household Exp	0.209***	-0.020***	0.207***	-0.020***	0.1957***	-0.023***	0.179***	-0.023***
	(0.0576)	(0.0033)	(0.0575)	(0.0033)	(0.045)	(0.003)	(0.0433)	(0.0030)
Log Household Size	-0.538***	-0.0112***	-0.527***	-0.011***	-0.4691***	0.0102**	-0.454***	0.0109***
	(0.1259)	(0.0036)	(0.1258)	(0.0036)	(0.0812)	(0.0042)	(0.0819)	(0.0041)
Proportion of Adults	-1.1367***	-0.0058	-1.012***	-0.005	-0.6308***	0.021**	-0.582***	0.022**
	(0.3118)	(0.0087)	(0.3075)	(0.0086)	(0.2246)	(0.0092)	(0.2230)	(0.0091)
Proportion of Males	-0.1332	0.040***	-0.1456	0.040***	-0.0903	0.064***	-0.1484	0.062***
	(0.2296)	(0.0072)	(0.2292)	(0.0072)	(0.1659)	(0.0076)	(0 .1616)	(0.0074)
Geotype:								
Tribal Authority Areas	0.2827*	omitted	0.2734	omitted	-0.0111	-0.019*	-0.0137	-0.017*
	(0.1719)		(0.1692)		(0.1297)	(0.0102)	(0.1249)	(0.0108)
Urban (Formal and Informal)	-0.1471	omitted	-0.1231	omitted	-0.1121	-0.0157	0.1116	-0.0173
	(0.1326)		(0.1304)		(0.1084)	(0.0109)	(0.1014)	(0.0108)
Household Head Male	0.151	0.0292***	0.1245	0.028***	-0.0523	0.003	-0.0203	0.0036
	(0.1593)	(0.0052)	(0.1592)	(0.0051)	(0.0944)	(0.0165)	(0.0955)	(0.0056)
H/hold Head Married or Partner	0.1195	-0.0073	0.1216	-0.007	0.0947	-0.0071*	0.0857	-0.007*
	(0.1199)	(0.0045)	(0.1201)	(0.0045)	(0.0833)	(0.004)	(0.0843)	(0.0040)
Household Head Race:								
Coloured	0.0824	-0.013*	0.0924	-0.014**	-0.2054**	0.018	-0.183**	0.0180
	(0.1331)	(0.0069)	(0.1324)	(0.0069)	(0.0976)	(0.014)	(0.0927)	(0.0140)
Asian and Indian	0.9885**	-0.0112	0.9154**	-0.011	0.2404	0.0149	0.1439	0.0148
	(0.3779)	(0.0115)	(0.3803)	(0.0116)	(0.3468)	(0.0099)	(0.3320)	(0.0099)
White	0.2976*	-0.0075	0.300*	-0.0076	-0.0316	0.0099	-0.0545	0.0097
	(0.1694)	(0.0081)	(0.1676)	(0.0080)	(0.1439)	(0.0104)	(0.1400)	(0.0104)
Household Head Education:								
Primary Incomplete	0.1634	-0.0005	0.1533	0.0011	0.0831	0.0074	0.0707	0.0076
	(0.1789)	(0.0049)	(0.1786)	(0.0049)	(0.1418)	(0.0051)	(0.1413)	(0.0051)
Primary Complete	0.2462	0.018**	0.1734	0.017*	-0.055	0.0223*	-0.0533	0.023**
	(0.2374)	(0.0090)	(0.2311)	(0.0090)	(0.1791)	(0.0121)	(0.1791)	(0.0121)
Secondary Incomplete	0.6145***	0.0056	0.5945***	0.0054	0.2216*	0.0066	0.1996	0.0059
	(0.1714)	(0.0050)	(0.1706)	(0.0050)	(0.1351)	(0.0043)	(0.1342)	(0.0043)
Matric	0.745***	0.019**	0.6978***	0.018**	0.5298***	0.011**	0.543***	
	(0.1871)	(0.0074)	(0.1859)	(0.0074)	(0.1485)	(0.0054)	(0.1477)	(0.0052)
Tertiary Education	0.996***	0.039**	0.812***	0.028*	0.6379***	0.014*	0.507**	0.0132
	(0.2646)	(0.0165)	(0.2431)	(0.0150)	(0.2291)	(0.0086)	(0.2160)	(0.0084)
Constant	0.3661	0.201***	0.3103	0.200	0.998	0.217***	1.115**	0.219***
	(0.6025)	(0.0299)	(0.6013)	(0.0299)	(0 .4675)	(0.029)	(0.4624)	(0.0290)
Cluster Fixed Effects		F=1.16**		F=1.17**		F=1.10*		F=1.12*
R squared	0.1453	0.1513	0.1368	0.1511	0.097	0.1109	0.0909	0.1132
Number of Observations	1037	4668	1031	4662	1628	7167	1616	7155

*Notes: *,**, and *** refer to statistical significance at 10%, 5% and 1% levels respectively. Robust standard errors are in parentheses. F-statistic is associated with the test for the joint significance of cluster fixed effects in equation (2). Specification (1) looks at the full sample and (2) considers only unit values that are less than 5 standard deviations from the mean. Under Geotype the omitted category is "rural formal", for race the omitted category is "Black" and for education the omitted category is "no education".*

TABLE A6: PRICE ELASTICITY OF DEMAND (ε_P) AND INCOME ELASTICITY OF DEMAND (ε_I) ESTIMATES, WAVE 3

	PRICE ELASTICITY			
	(1)		(2)	
	ε_P	95% Confidence Interval	ε_P	95% Confidence Interval
Coefficient	-0.5566***	(-0.5836, -0.5297)	-0.5899***	(-0.6179, -0.5619)
Standard Error	[0.0137]		[0.0143]	
Observations	356		356	
	INCOME ELASTICITY			
	(1)		(2)	
	ε_I	95% Confidence Interval	ε_I	95% Confidence Interval
Coefficient	0.2262***	(0.0726, 0.3797)	0.2291***	(0.0730, 0.3852)
Standard Error	[0.0734]		[0.0796]	
Observations	7167		7155	

*Notes: *,**, and *** refer to statistical significance at 10%, 5% and 1% levels respectively. Bootstrapped standard errors are in square parentheses. Specification (1) looks at the full sample and (2) considers only unit values that are less than 5 standard deviations from the mean.The number of observations for the income elasticity estimates are greater than those for the price elasticity estimates the former is estimated at the household level whereas the former is estimated at the cluster level.*

TABLE A7: PRICE ELASTICITY OF DEMAND (ε_P) AND INCOME ELASTICITY OF DEMAND (ε_I) ESTIMATES BY EXPENDITURE TYPE, WAVE 3

	PRICE ELASTICITY					
	TOP 50%			BOTTOM 50%		
	ε_P	Confidence Interval	n	ε_P	Confidence Interval	n
Specification (1)	-0.7942*** [0.0356]	(-0.8640, -0.7244)	356	-0.8836*** [0.0934]	(-1.0667, -0.7004)	344
Specification (2)	-0.8617*** [0.0405]	(-0.9411,-0.7822)	356	-0.9021*** [0.1004]	(-1.0999, -0.7053)	344
	INCOME ELASTICITY					
	TOP 50%			BOTTOM 50%		
	ε_I	Confidence Interval	n	ε_I	Confidence Interval	n
Specification (1)	0.3459*** [0.0930]	(0.1636, 0.5281)	3550	0.3102 [0.2203]	(-0.1216, 0.7420)	3617
Specification (2)	0.3630*** [0.0951]	(0.1767,0.5493)	3539	0.2845 [0.2205]	(-0.1477, 0.7167)	3616

*Notes: *,**, and *** refer to statistical significance at 10%, 5% and 1% levels respectively. Bootstrapped standard errors are in square parentheses. Specification (1) looks at the full sample and (2) considers only unit values that are less than 5 standard deviations from the mean. The number of observations for the income elasticity estimates are greater than those for the price elasticity estimates the former is estimated at the household level whereas the former is estimated at the cluster level.*

TABLE A8: PRICE ELASTICITY OF DEMAND (ε_P) AND INCOME ELASTICITY OF DEMAND (ε_I) ESTIMATES BY TYPE OF DRINKER, WAVE 3

	PRICE ELASTICITY					
	HEAVY DRINKERS			LIGHT DRINKERS		
	ε_P	Confidence Interval	n	ε_P	Confidence Interval	n
Specification (1)	-0.1699*** [0.0539]	(-0.2756, -0.0643)	242	-0.3902*** [0.0124]	(-0.4146, -0.3660)	356
Specification (2)	-0.1699*** [0.0539]	(-0.2756,-0.0643)	242	-0.4188*** [0.0132]	(-0.4447, -0.3929)	356
	INCOME ELASTICITY					
	HEAVY DRINKERS			LIGHT DRINKERS		
	ε_I	Confidence Interval	n	ε_I	Confidence Interval	n
Specification (1)	0.1494 [0.1490]	(-0.1427, 0.4414)	564	0.1498* [0.0908]	(-0.0283, 0.3279)	6603
Specification (2)	0.1494 [0.1490]	(-0.1427,0.4414)	564	0.1511 [0.0941]	(-0.0332, 0.3356)	6591

*Notes: *,**, and *** refer to statistical significance at 10%, 5% and 1% levels respectively. Bootstrapped standard errors are in square parentheses. Specification (1) looks at the full sample and uses a drinker-type cut-off of 730 standard drinks per annum and (2) considers only unit values that are less than 5 standard deviations from the mean but still uses the 730 standard drinks per annum cut-off. The number of observations for the income elasticity estimates are greater than those for the price elasticity estimates the former is estimated at the household level whereas the former is estimated at the cluster level.*

THE ECONOMICS OF ALCOHOL POLICY IN SOUTH AFRICA

CHAPTER 9

Literature Review on Illicit Alcohol in South Africa

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LITERATURE REVIEW ON ILLICIT ALCOHOL IN SOUTH AFRICA

1. INTRODUCTION

This review of the illicit alcohol market in South Africa will report on the main areas of interest for researchers attempting to understand the impact of excise taxes on this portion of the local liquor market. First, the definition of illicit alcohol will be discussed, and the various estimates of the market for it reported on and compared. The approaches that could be taken to measure this market will then be discussed, after which the evidence of the harm that the consumption and production of illicit alcohol has on society will be considered. Finally, policy options for the control of the illicit market, particularly within the context of excise taxes, are presented.

2. DEFINITION OF ILLICT ALCOHOL

It is necessary to define illegal or illicit alcohol before any discussion of its size or impact. There is currently no internationally accepted standard for the quantification of the informal alcohol market and the subsequent analysis of its effects (ICAP, 2010). The World Health Organisation refers to unrecorded alcohol as:

> *"alcohol that is not taxed and is outside the usual system of governmental control, because it is produced, distributed and sold outside formal channels. Unrecorded alcohol consumption in a country includes consumption of homemade or informally produced alcohol (legal or illegal), smuggled alcohol, alcohol intended for industrial or medical uses, alcohol obtained through cross-border shopping (which is recorded in a different jurisdiction), as well as consumption of alcohol by tourists."* (WHO, 2011:5)

The liquor industry definition refers to non-commercial alcohol, which is defined by the International Center for Alcohol Policies (ICAP) as "traditional drinks produced for home consumption or limited local trade (whether licit or illicit); counterfeit products and illicit mass-produced drinks; and surrogate, or nonbeverage, alcohol" (ICAP, 2010:2). These definitions are similar once the cross-border shopping and consumption of alcohol by tourists are removed. A recent study on the liquor industry in South Africa, which was commissioned by the Department of Trade and Industry, defined illicit alcohol as that which has evaded excise duties or was produced by an unlicensed brewer (Truen et al, 2012).

Within the South African context, a significant proportion of alcohol is sold in unlicensed venues, particularly shebeens. These venues may sell both legally and illegally produced beverages. As unlicensed venues, they are outside the regulatory regime that controls the venue-related consumption of alcohol (i.e. age requirements). However, as our discussion is concerned with on excise taxes, this report will not focus on the licensing issues surrounding shebeens, but rather on the consumption of illegally produced alcohol at shebeens and other such venues. The legally produced alcohol that is consumed at an unlicensed venue is still subject to excise taxes, since excise taxes are levied at the production level in South Africa, and consequently is not relevant for this discussion. Although excise taxes are not lost on the production of such alcohol, some revenue is lost as VAT not be levied by unlicensed venues on the value added.

In effect, the definitions of non-commercial alcohol and unrecorded alcohol amount to more or less the same measure for the local context. Unrecorded alcohol is the broadest definition, but since the legal consumption of alcohol across borders is unlikely to be significant in South Africa (in comparison to Europe,

for example) (Rehm et al, 2010), the estimate for this should be similar to the non-commercial estimate. The illicit alcohol definition supplied in the DTI liquor study would cover the categories outlined for non-commercial alcohol. However, as this report is primarily concerned with alcohol that has evaded or avoided excise taxes, the definition of illicit alcohol will be narrower still, and will only cover alcohol that has evaded or avoided excise taxes. This sub-category of the definitions discussed above will obviously create some discrepancies in the differing statistics reported for the South African market. However, where possible, the data for illicit alcohol will be extracted.

In effect, this chapter is concerned with alcohol that evades excise taxes. The schematic below provides a summary of the discussion above. This may be legal, illegal and/or unrecorded alcohol. Alcohol that is unrecorded but has excise taxes applied to it would not be included under this definition.

EVERY UNIT OF ALCOHOL CONSUMED FALLS SOMEWHERE IN THIS MATRIX			
	LEGAL	**POTENTIALLY ILLEGAL or UNRECORDED**	**ILLEGAL or UNRECORDED**
All excise tax paid			
Partial excise tax paid			
Total excise tax evasion			

Within this definition of illicit alcohol, there are 5 important categories of illicit alcohol:

- ***Illegal home-brew and concoctions including sorghum beer***
  - Commercially produced traditional sorghum beer. This market is entirely dominated by United National Breweries (UNB). Excise taxes are applied on a per litre basis to this alcohol.
  - Home-brewed traditional sorghum beer. This beer is brewed from a dry sorghum powder and uses traditional techniques. Excise taxes apply to the sorghum powder on a per kilogram basis.
  - Illegal home-brew and concoctions. This category includes sorghum beer that has been brewed from sorghum malt. Sorghum malt does not contain alcohol and cannot produce alcohol by itself. It therefore avoids excise taxes. This category also includes concoctions that may include sorghum powder, but most likely consist of sorghum malt, maize and bread as the main ingredients with additional, more harmful, substances. These ingredients are included to give the beer additional potency and may include battery acid, methylated spirits, brake fluid and other harmful substances. This category largely avoids excise taxes and is considered more harmful than traditional sorghum beer. It is on this category of home-brew or concoctions that this report will focus.
- ***Tax evasion by domestic producers***
  - Illegal manufacturing may occur by producers who do not pay any excise tax.
  - Under-reporting of alcohol volumes by producers may occur, resulting in lower tax liabilities.
  - Products intended for export to outside the SACU area may be diverted in transit. Since no excise is levied on exports intended for outside the SACU countries the goods are diverted into the domestic

market with no excise taxes levied. Additionally, goods may be legitimately exported, with or without foreign excise taxes and/or import duties paid, and then smuggled back into South Africa with no excise and/or import duties paid (round tripping).

- When excise tax is evaded, VAT is also lost; however, some VAT may be reclaimed if it is levied at later stages, such as at wholesale or retail level.

- ***Tax evasion by foreign producers***
  - Importers of foreign products might smuggle products over borders with no excise paid.
  - Importers of foreign products might under-report imported product, resulting in lower excise tax and/or import duty liabilities.
  - VAT is also lost on this, as VAT, as well as the excise and/or import duties, is charged on the value of the imports. However, some VAT may be reclaimed if it is levied at later stages, such as at wholesale or retail level.

- ***Counterfeit alcohol***
  - Counterfeit alcohol is alcohol that appears to be a well-known brand but the contents of which have not been produced by legitimate producers. It includes fake alcohol where the contents of the beverage are not accurately represented by the label, for example, cane spirits with caramel colouring being sold as brandy, the watering down of wine, etc. While it is possible that these manufacturers may pay excise tax, the illegal nature of their business makes it likely that excise taxes are evaded.

- ***Surrogate alcohol***
  - This is alcohol not intended for consumption and therefore excise taxes do not apply to it. This may include alcohol for medical or industrial purposes. It is illegally added to liquor and sold, thereby evading the taxes due on it.

There will inevitably be overlaps between categories in the discussion of the prevalence and characteristics of the informal and illegal sector in South Africa , but we will attempt to delineate the categories clearly where possible.

3. LESSONS LEARNED FROM ILLICIT TOBACCO IN SOUTH AFRICA

Illicit trade is a significant problem for tobacco control and potentially for the legal market for tobacco products.[1] The aim of tobacco control is to reduce smoking prevalence and cigarette consumption; illicit trade in cigarettes undermines tobacco control by allowing consumers and producers to evade tax, sometimes entirely, at other times only partially, thus lowering cigarette prices. Prices and affordability of

[1] The illicit trade in cigarettes can be broken down into two main categories: legally manufactured products on which excise taxes have not been paid (i.e. duty not paid) and illegally manufactured products. Smuggling is a feature of the illicit trade, as both legal and illegal products can be smuggled. Smuggling refers to the trade in illegally imported cigarettes and is often referred to as contraband. Illicit manufacturing refers to the manufacture of tobacco products which are not in compliance with local laws. Such laws may include taxation, licensing, or regulations which restrict the manufacture of tobacco products. Illicit manufacturing includes counterfeit production where products bear a trademark without the consent of the owner of the trademark. Some authors use the terms tax avoidance and evasion instead of illicit trade.

tobacco products are very important, if not the most important, determinants of the demand for cigarettes. Illicit cigarette trade is able to undermine significantly the use of taxation as a tobacco control policy tool.[2]

Higher taxes and prices create greater incentives for traders to enter the illicit market since the higher taxes and prices increase the "rents" they can achieve by avoiding or evading taxes. However, many other commodities that are not specially taxed also suffer from a large illicit market (e.g. music, films and, to a lesser extent, clothing and medicines). Thus, factors other than taxes also contribute to the illicit trade in commodities. These other factors include the value to weight/size ratio of the commodity, border and customs enforcement, the existence of organised crime syndicates and corruption. Furthermore, tax increases do not necessarily result in price increases or price increases of the same magnitude as the tax, and thus it is important to consider that it is also the tobacco industry's pricing policies that influence the "rents" achieved by avoiding or evading taxes.

Generally, the focus of illicit trade has been in high-income countries, primarily because taxes and prices are considerably higher in high-income countries than in low- and middle-income countries. Furthermore, the problem of illicit trade has been more thoroughly documented in high-income countries, most probably owing to data availability and the existence of large databases of tobacco industry documents released through litigation, particularly in the United States and United Kingdom.[3] Additionally, higher per unit taxes in high-income countries mean that government revenue losses are significantly higher, creating a greater incentive for governments to investigate and reduce illicit trade.

Upon further inspection, the more well-known cases have unique narratives. For example, in the United States, illicit trade has been made easier by state level taxation, where each of the fifty states (and the District of Columbia) apply their own, often unique, tax regimes complicated by open state borders. Additionally, some city and country authorities apply their own taxes on top of the state taxes. Thus consumers and even commercial bootleggers have incentives to cross state borders to purchase cigarettes for their own consumption or for resale. Making matters more complicated is the availability of tax free cigarettes from Native American Reservations.[4] More recently the purchasing of cigarettes across state lines via the internet has also become prevalent (see Goolsbee *et al.*, 2010).

In Canada, cross-border smuggling from the United States was common in the early 1990s. Cigarettes were legally manufactured in Canada and then exported to the United States with no Canadian taxes applied. The cigarettes were then smuggled back into Canada by organised crime syndicates with no tax paid. The Canadian cigarette manufacturers were complicit in organising the smuggling and recently paid significant fines to the Canadian government in out of court settlements and admission of guilt fines (see Joossens and

[2] Conceptually, there are different interpretations of how illicit trade undermines tobacco control. One may consider *any* amount of illicit trade to undermine tobacco control. However, if illicit trade occurs as a result of tobacco control policy (i.e. tax increases) one might interpret illicit trade to undermine tobacco control efforts only if the net effect of the policy is counterproductive. This would occur if tax increases result in such a large volume of illicit trade that revenue collections decline and smoking prevalence increase. A compromise interpretation of something in between would be quite nuanced and difficult to define. Since the goal of tax policy and tobacco control is to increase revenue and reduce consumption and prevalence we consider illicit trade to undermine tobacco control if and only if the goals in terms of revenue and prevalence are not achieved.

[3] In the United States, the primary problem is individual level tax avoidance and evasion as a result of differences in tax between state and local jurisdictions. Most of the research has focused on this problem.

[4] This problem is unique to the United States and Canada.

Raw, 2008). The purpose of the smuggling operations was to undermine the tax regime and force the Canadian government to reconsider their tax increases, which they did.

In Europe the experience was very different. Although cross-border shopping has existed for some time, the larger problem was of untaxed smuggled cigarettes entering Western Europe from Eastern Europe. The fall of communism and the prevalence of organised crime syndicates drove the trade. Joosens and Raw (1998) attribute cigarette smuggling in Europe to fraud, while Von Lampe (2005: 226) attributes the rise of the cigarette black market in Germany to the development of "ethnically defined supply and distribution networks". However, several European countries, namely the United Kingdom, Spain and Italy, have seen a dramatic reduction in illicit trade without lowering taxes (see Joossens and Raw, 2008). Methods used to reduce illicit trade included the use of improved technology to scan shipping containers, fiscal markings (tax stamps), tracking and tracing systems, increased punishment, more customs officers, and campaigns to increase public awareness. In all cases significant tobacco industry involvement has been alleged and legal proceedings and agreements with the industry have also played a role in reducing illicit trade.

In low- and middle-income countries the illicit trade problem is different. Taxes and prices are generally lower, in both relative and absolute terms, than in high-income countries, creating fewer direct financial incentives to enter the illicit market (i.e. lower profit). However, the non-tax/price incentives are greater--more corruption, fewer customs and border controls, and lower penalties—and, by implication, the risks are lower. Furthermore, organised crime syndicates are more prevalent. Recent evidence suggests that the prevalence of illicit cigarettes in many low- and middle-income countries is higher than the prevalence in many high-income countries (Joossens *et al.*, 2010). Thus, the expected payoff in low- and middle-income countries (with low profit but low risk) is equal to or greater than the expected payoff in high-income countries (with high profit but high risk).

The tobacco industry's role in some forms of illicit trade is often unclear.[5] Interestingly, the incentive often exists for the tobacco industry to inflate the size of the illicit market since their recommended remedy is to lower taxes. They also argue against future tax increases on the grounds that it will encourage illicit trade. In some cases the industry has been actively involved in illicit trade in order to undermine the tax system and to help promote new brands in markets in which they are not yet present. In addition to Canada and Europe there have been other cases where the tobacco industry has been directly or indirectly involved in illicit trade including in Asia (Collin *et al.*, 2004), China (Lee and Collin, 2006), Africa (LeGresley *et al.*, 2008) and Lebanon (Nakkash and Lee, 2008).

The illicit trade in cigarettes in South Africa is also interesting and gives cause for concern. South Africa has undertaken an ambitious program to increase the taxes on cigarettes. Between 1993 and 2009 excise taxes have increased by 372% in real terms resulting in prices rising by 163% in real terms. Van Walbeek (2005) considers these tax and price increases to be the overwhelming reason that tobacco consumption and smoking prevalence fell so dramatically in the late 1990s and early 2000s. The tobacco industry has long argued that high taxes are responsible for the growth in illicit cigarettes. The Tobacco Institute of South Africa, a body which represents the majority of tobacco growers and cigarette manufacturers, claims the size of the illicit market is 20% of the total (legal and illicit) market (Tobacco Institute of South Africa, 2008). They had previously claimed it to be between 5.5% and 11% in 2004 and 15% in 2006 (Tobacco Institute of South Africa, 2004 and 2006). However, Sahawi, a low-price producer, claimed in 2007 that the illicit market was only between 5% and 10% of the total market (*Sunday Times*, 2007). No research has been

[5] With the exception of counterfeit cigarettes which they are often interested in reducing.

published in the peer-reviewed literature to substantiate these claims, which are used to lobby against tax increases. Data on the confiscation of illicit cigarettes is also presented, although there is no evidence of correlation between confiscations and illicit trade. Increases in confiscations might imply better enforcement rather than an increase in illicit trade. It is believed that almost all illicit cigarettes in South Africa are sold in the informal sector.

However, independent research articles published in the peer-reviewed literature present different outcomes. Blecher (2010) used a "gap method", estimating the total market using data on smoking prevalence and smoking intensity and then subtracting the legal market. This method yielded results significantly lower than industry estimates for 1997 to 2007. The paper shows that the size of the illicit market grew substantially from 1997 until it peaked in 2000 at between 9.4% and 11.5% of the total market. The most recent estimate for 2007 suggests that the illicit market occupied between 7.0% and 11.2% of the total market. These estimates are significantly lower than the anecdotal claims of the tobacco industry. Although the scale of the illicit market is significant, it has not undermined tobacco control policy. Consumption in the total market, including both the illicit and legal market, has declined in size consistently. At the same time, tax revenue from higher excise taxes has offset the tax losses as a result of illicit trade. An update to this paper, with an identical method, shows illicit trade peaking at 16.9% in 2010, but declining to 12.3% in 2012.

Van Walbeek (2013) compared the growth in tax-paid cigarettes with the growth in total cigarette consumption, based on a simulation model. The simulated growth in cigarettes is based on the well-established empirical result that cigarette consumption is primarily a function of income and the real price of cigarettes. The difference in the simulated growth in cigarettes and the growth in the number of tax-paid cigarettes is held to be the growth in the illicit market. Van Walbeek finds that the industry's claims that there has been a rapid increase in the illicit market is not supported until 2008, or even 2009. However, there is a sharp increase in the illicit market in 2010, which then peaked in 2011. In 2012 the illicit market decreased.

Van Walbeek and Shai (2013) look at the public pronouncements of the tobacco industry over time, especially those regarding the size of the illicit market. They find that between 2006 and 2011 the industry estimated that the illicit market at the time was 20%, but increased their estimates to 25% in late 2011 and to 30% in 2012. They also noted that the tobacco industry retrospectively decreased their historical estimates of the illicit market. For example, they currently claim that the illicit market in 2008 was only 8%, even though they were claiming at the time that the illicit market was 20%. These significant contradictions raise serious questions about the integrity of their historical estimates, and, more importantly, about the integrity of the current estimates. If historical estimates by the industry were wrong, even by the tobacco industry's own admission, why should we believe the current estimates?

Tobacco control efforts would be undermined if total consumption (i.e. both legal and illegal) did not decline in response to a tax/price increase. Furthermore, tax policy would be undermined if an excise tax increase resulted in a decline in tax collections. This could occur if the increase in tax resulted in a significant enough decline in legal consumption. However, as the evidence shows, tax increases in South Africa have significantly reduced tobacco use and increased government revenue. Therefore there is no evidence to suggest that the illicit trade in tobacco products has undermined the public health and fiscal policy objectives.

4. ESTIMATED SIZE OF THE ILLICIT ALCOHOL MARKET IN SOUTH AFRICA

The estimation of the size of the illicit alcohol market is understandably highly contentious, as there has been little research conducted in South Africa that representatively samples the local population. The estimates are typically derived from expert opinion that has yet to be tested by evidence-based research. The illegal nature of much of the market means that it is inherently difficult to observe and thus measure. Additionally, different actors have different incentives when estimating the size of the market. For instance, the alcohol industry may wish to overstate the level of illicit trade since they argue that taxes are the primary driver of illicit trade. Their remedy for illicit trade is therefore to lower taxes or not to increase taxes, resulting in lower prices, leading to an increase in the aggregate market or alternatively to greater profit margins. The four most important estimates that have emerged in the past decade or so are discussed below.

4.1 WORLD HEALTH ORGANISATION ESTIMATE

The latest global report from the WHO (2011) on the status of alcohol and health includes an estimate on the size of the unrecorded liquor market. This is a figure from 2005 that was derived from empirical investigation and expert opinion. It is quoted in litres of pure alcohol and is based on the consumption of individuals over 15 years of age over a calendar year: 2,5 litres of a total 9,5 litres. This unrecorded proportion of 26% is slightly below the global average of 28,7% and the African average of 31,4%. This is the largest estimate of the size of the market and also the most quoted, particularly by the alcohol industry experts. From the point of view of this report, it is not clear how much of this unrecorded alcohol could be considered illicit (i.e. no excise tax paid).

4.2 SOUTH AFRICAN NATIONAL TREASURY ESTIMATE

The National Treasury report on alcoholic beverages (2002) was important as it informed many of the regulatory responses to the illicit alcohol market, particularly to sorghum beer. This report does not attempt to estimate the actual size of the market, in the manner in which the WHO or other researchers attempt to do, but rather focuses on estimates of the excise revenue lost as a result of illegal activities. They estimate that R150 million of excise tax revenue is lost per year as a result of illegal spirits, notably illegal brandy sales. Considering that the nominal excise tax revenue in the 2000/2001 fiscal year was approximately R4 billion, the estimated loss of revenue only equated to 3,75% of the revenue earned. This seems particularly low, but it does not include the excise revenue lost from illegal home-brews, nor illegal wine sales. Once these are included (calculations discussed below), the percentage increases to only 5,4%.

The Treasury estimated that over 60% of the estimated 1 200 million litres of home brewed sorghum beer evaded excise taxes, i.e. 720 million litres of untaxed home-brew or concoctions were made from sorghum malt and other ingredients. The remaining 480 million litres of home-brew would have contributed some excise taxes from the sale of sorghum powder. Sorghum beer only attracted an excise duty of R2.48 per litre of absolute alcohol in 2000/2001, which is almost a tenth of the duty contributed by clear malt beer at R22.39 per litre, or spirits at R30.33 per litre. Once data from the illegal home-brew market is included, this increases lost excise revenue by over R50 million. No estimates were provided in this report on the loss in excise revenue from illegal wine, but later calculations (Treasury, 2010) implied that 18 million litres of illicit wine were being sold per year. Using the data available from both Treasury reports, the following approximate calculations were generated:

TABLE 1: ILLICIT MARKET ESTIMATES FROM NATIONAL TREASURY

TOTAL	ILLEGAL SPIRITS (MOSTLY BRANDY)	ILLEGAL HOME-BREW SORGHUM BEER	ILLEGAL WINE SALES
Excise revenue loss	R150 million (R250 million in 2010 report)	R54 million	R12 million
Excise duty 2000/2001	3 033.65 cents per litre of absolute alcohol	7.45 cents per litre of beer at 3% absolute alcohol	Unfortified still wine: 565.83 cents per litre of absolute alcohol
Calculated litres of absolute alcohol consumed in illegal alcohol market	4 944 538 litres per year of absolute alcohol	21 600 000 litres per year of absolute alcohol	2 160 000 litres per year of absolute alcohol

This calculation reveals that the largest proportion of the illegal market exists in the home-brew sorghum market, which may include more harmful concoctions. Per capita consumption of illegal alcohol (based on an estimated 30 million people over 15 years of age in 2000) would therefore be approximately 1 litre per year. This is significantly lower than the WHO estimate, but this is to be expected due to the inclusion in the WHO definition of home-brew that has earned excise revenue (as home-brew would still be seen as unrecorded). Even when this legal home-brew is included, the per capita is still much lower than the WHO estimate, but as all the estimates provided thus far are largely calculated on expert or industry opinion, the figures are open to further investigation. Returning to the definitions discussed above, the Treasury report would suggest that the first section, illegal home-brew and concoctions, is the most significant for South Africa, and consequently any discussion on excise duties should pay special attention to the sorghum beer and flour market. This report does not seem to see surrogate alcohol as an area of concern at all.

4.3 DNA ECONOMICS ESTIMATE FOR THE DEPARTMENT OF TRADE AND INDUSTRY

The DNA Economics study on the National Liquor Act (Truen et al, 2011), which was commissioned by the Department of Trade and Industry, indicated that 14% of absolute alcohol consumed in South Africa is estimated to be illicit in some form or another, either by evading excise duties altogether, or through production for sale by an unlicensed brewer. We are most concerned in this discussion about the alcohol that evades and avoids excise taxes, not the unlicensed brewing which may or may not evade or avoid excise duties. The largest proportion of the illicit alcohol market defined by the DNA Economics study is the “backyard concoctions” market, which makes up 86% of the total illicit market or 12% of total consumption. The remaining 2% is split between illegal wine and spirits. The source of these estimates appears to be primarily industry bodies and commercial producers. DNA Economics indicated a declining trend in the sale of sorghum malt, but as it is not possible to extrapolate the amount of malt that is used in illegal home-brew production, they do not attempt to estimate the size of this market. Their data indicate that at least 728 million litres of sorghum beer were home-brewed from dry sorghum powder in 2010. The quantity of homebrew litres could be much higher if additional ingredients are added to the brew. The industry estimated that 9 million litres of spirits (or approximately 3.9 million litres of absolute alcohol) evade excise duties each year, amounting to R342 million in lost tax revenue. The industry also estimated that 20 million litres of wine (or approximately 2.4 million litres per year of absolute alcohol) is sold illicitly each year.

The figures from this report differ from the Treasury calculations, in that the quantity of the illegal spirits is larger than the Treasury suggested in 2002. The size of the illegal wine market is similar. However, as the

report does not attempt to break down the backyard concoctions market into those which have evaded excise taxes, and those which have paid them, it is not clear how the 12% estimation was derived. It is clear from both studies that the home-brew or backyard concoctions market is by far the most significant proportion of this market.

4.4 SADC STUDY INTO ILLICIT TRADE IN ALCOHOL ESTIMATE

The SADC report into the illicit trade of alcohol and cigarettes (Lester et al, 2012) indicated that academic and sector research in this area are lacking but that the industry estimates for 2009 were about 16 million litres of illicit spirits and about 40 million litres of illicit wine in South Africa. Despite the study being conducted by similar researchers (DNA Economics), the numbers are much higher than indicated in the DTI report. This may indicate that additional data had come to light or that industry estimates were inflated to avoid further excise tax increases. Elizabeth Allen was one of the lead authors on this report. She is associated with International Tax and Investment (ITIC) that is funded by all the major tobacco brands and has lobbied against tax policies on tobacco and tackling the illicit trade in tobacco (Tobacco Tactics, 2013). This implies that there may have been some bias in the report, overestimating the extent of the illicit market. No data were provided on home-brew as this report was focused on cross-border smuggling within the SADC region.

4.5 PREVALENCE DATA FROM AMPS

The chapter included in this report on the prevalence data supplied by AMPS provides some tentative indications as to the trend of illicit alcohol consumption. The AMPS survey does not include questions on the legality of the alcohol consumed, but it does include questions on the consumption of sorghum beer. As we have seen, illicit home-brewed sorghum beer is by far the largest category of illicit alcohol consumption when measured in pure alcohol, and if we assume that the trend of illicit consumption follows the trend of total consumption of sorghum beer, we can draw some conclusions on consumption of illegally brewed sorghum beer and concoctions. The AMPS data indicates that the consumption of sorghum beer is falling as incomes rise. Overall prevalence of sorghum beer consumption fell between 2001 and 2012 significantly for men, at -0,57% per year, with an insignificant decline in consumption for women. Heavy drinking prevalence also fell for male drinkers of sorghum beer, by -0,31% per year, but again the change in female consumption was not significant. When broken down by province, all significant results indicated a fall in sorghum consumption prevalence. The highest prevalence and heavy prevalence for sorghum beer is amongst older drinkers (50+ years) and those that are in the lower LSM groups (1-6). These results make intuitive sense, as sorghum beer drinkers are more likely to be the older generation, who drink sorghum beer as part of their traditional ceremonies. Additionally, sorghum beer is seen as an inferior good that is consumed less as incomes rise.

4.6 SUMMARY

The estimates provided above vary in terms of the approximated size of the illicit market as well as the definition used for the market. The estimates generated for South African authorities (The Treasury and the DTI) indicated a much smaller illicit market than did the WHO study: 1 litre versus 2,5 litres and 14% versus 26% share of consumption. However, the consistent finding is that the highest alcohol consumption, in terms of pure alcohol, is illicit home-brew, followed by spirits and then wine. And as we have seen from AMPS data, the consumption of sorghum beer has been declining over the past decade. The table below summarises these findings:

TABLE 2: SUMMARY OF ILLICIT MARKET ESTIMATES

Study	Definition used	Spirits	Wine	Home-brew	Total per capita
WHO	Unrecorded consumption	N/A	N/A	N/A	2,5 litres
TREASURY	Illicit alcohol	5 million litres	2,2 million litres	21,6 million litres	1 litre
DTI	Unrecorded & Illicit alcohol	3,9 million litres	2,4 million litres	21,8 million litres	0,8 litres
SADC	Illicit alcohol	6,9 million litres	4,8 million litres	N/A	N/A

Note: All figures indicated in pure alcohol

5. MEASUREMENT OF THE ILLICIT MARKET

Gathering more accurate data on the size and nature of the illicit alcohol market in South Africa will require additional research, and there are regions where more accurate or credible estimates have been made. This research area is understandably tricky, as it deals with an illegal market, and under-reporting is to be expected. However, European researchers have attempted various approaches to quantify the size of this market. Nordic countries in particular have been concerned about unrecorded alcohol levels, largely because of the high levels of unrecorded spirit consumption (Leifman, 2001). Two papers consolidate much of the knowledge gained in Europe on the measurement of the unrecorded alcohol market.

Razvodovsky (2010) discusses various approaches that have been used to estimate the unrecorded segment of the alcohol market. The simplest and most often used approach is through population surveys, where survey data is compared to reported alcohol sales data. This approach has its drawbacks, as respondents typically underreport their drinking habits. This may be overcome if systemic underreporting is proportional in nature, as long as the proportionality factor can be estimated. The surveys may also not be representative, as they may not include heavy drinkers who are more likely to consume illicit alcohol. Pomerleau et al (2008) also included this as an issue when discussing the results of an alcohol consumption survey in Eastern Europe:

> *"heavy drinkers are generally less likely to participate in surveys and some individuals unable to give consent were intoxicated and thus excluded from the study. Furthermore, those who drink frequently to intoxication are unlikely to be able to recall accurately how much they consumed."*

Additionally, this method requires significant financial expenditure. A cheaper method of estimation is using indirect methods, such as associating positive blood alcohol concentrations and alcohol-related violent deaths, as was done in Russia. A similar approach was used in Poland and Belarus with the correlation of alcohol consumption and alcohol-related psychosis. In Norway, a composite indicator, which measured alcohol related mortality, was used to estimate unrecorded consumption. This method was used in the Leifman study discussed below. The accuracy of these estimates is highly dependent on whether alcohol consumption is the only factor affecting alcohol-related problems. Furthermore, for an accurate extrapolation of indirect results, there needs to be an estimate initially of the unrecorded alcohol market. The other method briefly discussed was the Russian calculation of the size of unrecorded market on the basis of sales data on the ingredients that are used in the production of homemade spirits, in that case, sugar. However, as in South Africa, this method can only be used for some of the alcohol consumed, as the proportion used for illicit alcohol is unknown and illicit alcohol also includes counterfeit and surrogate alcohol.

The Leifman study (2001) provided estimations of unrecorded alcohol consumption in 14 European countries. The most common method of estimating unrecorded alcohol consumption is through the administering of national surveys. Leifman supplements this data with additional data sources. Most interestingly, he uses indirect estimations from alcohol-related mortality data to determine if there is a discrepancy between the observed effects of alcohol use and the expected effects from recorded alcohol consumption, which could have resulted from unrecorded alcohol consumption. He gauges for each country how a 1 litre increase in alcohol consumption would affect the alcohol mortality rate. From this he calculates the unrecorded alcohol segment of the market. This approach comes with its own difficulties, primarily as a result of assuming that the alcohol mortality rate is consistent over time and not affected by other factors. Through the use of representative surveys and alcohol mortality data, a more accurate estimate of the total consumption of alcohol may be generated.

From the experience gained in Europe, we can assume that measuring the size of the unrecorded or illicit market in South Africa will require some survey data, with as wide a representation as possible. This will then need to be correlated with data on alcohol-induced harm or disease in order to extrapolate the results and provide trend data. South Africa is already using data on the ingredients sold for sorghum powder to estimate the home-brew market. Much of this consumption, however, may fall into the concoctions category which has a higher alcohol content and more severe health effects. Therefore sampling of this market is suggested so as to provide a more indicative estimate of the absolute alcohol consumption of this relatively large unrecorded segment. This is critical in order to understand how excise taxes have had an impact on unrecorded consumption. It is clear that there is a greater need for further research on this topic in South Africa.

6. HEALTH HAZARDS OF ILLICIT ALCOHOL

Thus far the discussion has shown that although the estimates of the size of the illicit market vary widely, it is a significant proportion of the alcohol consumed in South Africa. Beyond the problems of illicit alcohol evading excise taxes and regulation, what are the health implications of the consumption of this type of alcohol? If the raising of excise taxes drives alcohol consumption underground, will this increase the alcohol health burden on society? The alcohol industry stresses the health issues with the unrecorded segment of the alcohol market, indicating that illicit and home-brewed alcohol carry higher health risks than branded products (Econometrix, 2013) but do not cite any references to substantiate the higher health risks. The alcohol industry's assertions that the unrecorded or non-commercial sector of the liquor market carries higher health risks is mirrored in ICAP-sponsored international publications (Botha, 2010 and Adelekan) but these do not back up this assumption with anything beyond anecdotal headlines.

In fact, the question surrounding the additional health hazards of illicit alcohol has not yet been proven conclusively one way or the other. The following discussion will first focus on some international studies that have attempted to measure the health impact of illicit alcohol. We then return to South Africa to draw on more anecdotal evidence of the health concerns surrounding this illegal activity.

6.1 INTERNATIONAL EVIDENCE OF THE HARMFUL EFFECTS OF ILLICIT ALCOHOL

The moonshine markets study (Haworth & Simpson, 2004) indicated that non-commercial alcohol may not always be harmful to health. The reports of poisonings from locally produced alcohol seem to relate more

to poor production processes, or "bad batches", than to non-commercial alcohol in general. Research from Europe (Lachenmeier, 2012) shows that the extra health hazards from the consumption of illicit alcohol primarily arise as a result of the higher alcohol content in illicit brews, a higher consumption of the alcohol as it is cheaper, and that those who do drink illicit alcohol are more likely to have detrimental consumption patterns. The health impacts of the higher ethanol consumption may be the most important factor in the consumption of illicit alcohol (Lachenmeier et al 2013). However, the toxicity of the contents of the alcohol may also present a problem, the most common being the accidental poisoning of the brew with lead or methanol. There is generally a lack of global scientific evidence for the level of contamination or toxicity of illicit alcohol (Lachenmeier & Rehm, 2009). A literature review of the evidence of the impact of unrecorded alcohol conducted in 2010 (Rehm et al, 2010) tried to address this lack of data. They found that toxic metals such as lead were sometimes found in the illegal brews owing to contaminated water, that faults in the production process sometimes led to higher alcohol levels, that illicit alcohol can also contain carcinogenic contaminants from fruit and sugarcane, or contaminants from surrogate, non-beverage alcohol and toxic compounds from denatured alcohol. The conclusion was that higher ethanol concentration is consistently found in unrecorded alcohol but that this may not account for the full extent of the health issues associated with unrecorded alcohol consumption.

The most common dangers from the consumption of illicit alcohol therefore seem to occur as a result of the increased ethanol levels, the accidental poisonings of batches of home-made alcohol or the consumption of surrogate alcohol which may contain toxic constituents (Lachenmeier et al, 2007). The exact nature and proportion of these health hazards is currently unknown.

6.2 SOUTH AFRICAN EVIDENCE OF THE DANGERS OF ILLICIT ALCOHOL CONSUMPTION

The South African evidence of the dangers of illicit alcohol consumption is anecdotal in nature and largely based on press reports of dangerous concoctions. A study was performed in the Mopani district of Limpopo (Makhubele, 2012) that studied in more detail the consumption of concoctions within a poor community. The study did not attempt to measure the prevalence of this type of alcohol but provided some indications of the ingredients that were being added to the more popular concoctions. The study also found that, recently, hazardous substances were being added more frequently to the concoctions for commercial reasons. The names of the concoctions are illustrative of their harmful effects: *Ndzi ta ku nyisa*, which means "I will beat you up" or *Xikwembu ndzi teki*, which means "God takes me". Some of the ingredients added are listed: methylated spirits (i.e. denatured ethanol), cabbat (a substance used to fast-track the ripening of bananas), sorghum malt, maize meal, yeast, brake fluid, battery acid, water from boiled roots of jinja shrub, and ice cream. This study largely echoes similar research from Botswana (Pitso, 2007) that showed that most home-brew was made from sorghum malt, water and sugar. To this were added poisonous ingredients to make the brew more intoxicating.

Press reports of the harmful effects of these concoctions provide additional, yet anecdotal, evidence of the dangers of toxic home-brews. In the Eastern Cape, police admit that the brewing of concoctions is widespread in informal settlements, primarily in urban areas. On the bigger raids they are confiscating 3 000 litres of concoctions at a time (Carrels, 2005). A popular concoction in the area is called *Umtshovalale* and contains methylated spirits, dry yeast, brown sugar, snuff, and metal polish (Brasso), amongst other ingredients (Sithole & Jelu, 2006). A brewer recently reported that she made and sold 75 litres a day of the concoction at R2.50 a litre. She indicated that the production and consumption of the

concoction was common in the township, with a brewer on every street (Macgregor, 2012). *Umtshovalale* has been known to cause deaths (Spies, 2006) but how many deaths is currently unknown. What is clear is that the sale of this liquor is primarily to very poor people, who are price-sensitive, and are looking for a cheap drink. The consumption of these home-made brews is possible within a day or two of production.

The production and distribution of illicit spirits has also been reported. These spirits are at times distributed under the brand names of legal products and are typically sold at low prices as they have evaded excise taxes (Treasury, 2002). Police seizures of illegally manufactured alcohol have found liquor with counterfeit labels such as Smirnoff, Russian Bear and KWV (Simon & SAPA, 2003). The seizure of 60 000 litres of illicit alcohol by SARS in the 2011/2012 financial year provided some indication of how the alcohol was being produced and distributed. The smuggling of raw alcohol from sugar-cane rich countries such as Mozambique and Swaziland into South Africa was one method used. Illicit manufacturing was also conducted locally. A common technique was the use of cane spirits and colourants to produce fake brandy. The replacement of ethanol with methanol or acetone had also been reported in the manufacture of white spirits. These are then labelled under their own brand names or legitimate brand names and sold as "cheapies" to distribution outlets (Booysen, 2012). The recent DTI report by DNA Economics corroborated these reports by purchasing a bottle of cane spirits at an off-licence in Pretoria for less than the estimated minimum retail price, which excluded distribution and retail margin (Truen et al, 2012). Industry representatives believe that most of the illicit ethanol is smuggled into the country and blended into white spirits (Truen et al, 2012). The loss of excise and industry revenue from the illegal manufacture and import of spirits does not imply that the health risks of consuming this alcohol are any higher than for legal alcohol, although the inclusion of poisonous substances in the brews may have long-term health effects. As discussed in the international studies, the health risks likely occur because of the potentially higher ethanol level, the increased consumption of the alcohol due to its lower cost and the consumption habits of those consumers who choose this alcohol. One of the few reported instances of a serious health risk associated with the consumption of an illegal spirit was the six deaths caused by a "fake brandy" in Cape Town (Mtyala, 2009).

The sale of surrogate or industrial alcohol has also been reported, with cane spirits intended for medicinal purposes being sold as fake brandy (The Star, 2000). Methyl alcohol, which is intended for industrial and medicinal uses, has been used to manufacture beverages (Kirk, 2001). Little evidence, however, currently exists in South African of the dangers of the consumption of this type of liquor. The production and distribution of illicit spirits has been associated with organised crime (Gillespie, 2011), which may then fuel criminal activities in other areas.

6.3 SUMMARY

Overall, it appears that the most dangerous health hazards from the consumption of illicit alcohol occur in the concoctions market. The size of this market has proven very difficult to estimate and, despite anecdotal evidence that this market is growing, reduction in the sale of sorghum malt (33% from 1997/98 to 2009/10) may actually indicate a fall in the production of home brewed beer (Truen et al, 2012). This was corroborated by the prevalence data from AMPS. However, this is very difficult to establish as the variety of ingredients used in the production of a concoction may obscure the correlation of sorghum malt with overall concoction brewing.

7. THE ROLE OF EXCISE TAXES IN ILLICIT ALCOHOL PRODUCTION AND CONSUMPTION

The effectiveness of excise taxes as a policy measure to reduce alcohol consumption, and/or gather revenue to recoup some of the costs incurred due to alcohol abuse and misuse, is largely dependent on ensuring that excise taxes are applied as widely as possible. If substantial proportions of the population are drinking alcohol while avoiding or evading excise tax, then the excise tax revenue will likely be too low to cover alcohol-related societal costs. In addition, excise taxes may reduce the demand for alcohol, but this will be ineffectual if the consumer is able to avoid or evade higher taxes through illegal consumption. Because of this, excise taxes need to be applied in such a manner that higher tax rates would not drive consumption into the illicit market. Therefore any excise tax increase needs to take into account the capacity of government to control the production and distribution of illicit alcohol (in broader terms the effectiveness of tax administration and enforcement). High taxes could lead to increased levels of smuggling and illicit production. The Treasury (2010) estimated that the total loss in excise tax revenue over the first decade of the current century has been R1.3 billion. Increasing excise tax levels may increase these losses, through the higher potential of tax revenue loss and the increased likelihood of illicit consumption. This loss would need to be weighed against the increased revenue from excise taxes needed to tackle the issues of alcohol-related harm.

Policy options that directly address the illicit alcohol market are limited. In a literature review on the policy interventions that have been conducted (Lachenmeier et al, 2011) and the results that they produced, the simplest approach suggested in order to reduce illicit alcohol consumption was in fact lowering excise taxes. This would lower the price of legal alcohol and therefore reduce the incentive to purchase illicit alcohol. The side effect of this policy option is that it can increase total alcohol consumption. Reducing the illegal trade and counterfeiting of alcohol involved the introduction of tax stamps and electronic surveillance systems. It was acknowledged that the most problematic category of illicit alcohol control was the home-brew sector. The most promising policy option suggested was the introduction of financial incentives for producers to register their products. This is the most important area of control in South African, but the applicability of this policy option needs to be explored in more detail.

The question of how excise taxes affect the illicit market is unanswered in South Africa. A study on this question in Scandinavia (Nordlund & Österberg, 2000) found that problems of unrecorded alcohol consumption are highest in countries with the strictest alcohol regulation and the highest excise taxes. Conversely, these countries also have lower alcohol consumption overall. Their conclusion was that policy makers need to debate what is more important to their society – lower criminality and higher alcohol consumption or higher criminality but lower alcohol consumption. Both options have their own form of costs to society, but which is considered more detrimental? An alternative view of the debate looked at the cost-effectiveness of policy options in the developed world (Anderson et al, 2009). Their conclusion was that, in countries with high levels of unrecorded production and consumption, increasing the proportion of alcohol that is taxed is a more cost-effective strategy than increasing alcohol taxes. They estimated that the reduction of unrecorded consumption through tax enforcement strategies would cost 50 – 100% more than increasing the proportion that is taxed, but would result in similar levels of tax revenue earned.

Research conducted in South Africa largely pushes for caution in raising the levels of excise taxes, owing to the size of the home-brew market. Parry et al (2003) suggested that the concoctions market was growing

and that this indicated that consumers were trading down. This conclusion was derived from the fact that the sale of commercial sorghum beer was declining while the sale of sorghum powder and sorghum malt was increasing, indicating an increasing home-brew market. However, this trend was contradicted in the later Truen et al (2012) study that reported an overall fall in sorghum malt sales. They attributed this to a decline in the production of home-brewed beer. This has been corroborated by the AMPS prevalence data. The impact of excise taxes on the home-brew market is difficult to evaluate: the excise taxes on sorghum beer and powder are extremely low and have remained so for many years. The evidence seems to suggest that the relatively higher taxes on other alcohol have not driven more people into the home-brew market. Yet it could be speculated that raising the taxes on sorghum powder and beer may push sorghum beer consumers into the concoctions market, where the sorghum malt ingredients would not attract any excise taxes. In this case, the total size of the home-brew market would remain the same but the proportion of the market that was both evading taxes and consuming concoctions would grow. This is purely conjecture at this point, as there is little evidence in South Africa to support it, but, considering the price sensitivity of the consumers in this market, it may not be entirely improbable. The Treasury (2002) also noted that commercially and home-brewed sorghum beer (from sorghum powder or malt) are close substitutes and that increasing the excise taxes on sorghum beer and powder would only shift consumers to the unregulated and untaxed home-brew sorghum malt market.

An increase in excise taxes could also stretch the police and customs officials beyond their current capacity to contain the predicted rise in smuggling and illegal alcohol production. This view is corroborated by the DTI study (Truen et al, 2012) that states that an increase in excise taxes should only be considered if there is the ability to stop excise evasion activities. They point out that the ethanol market is of particular concern, as the excise duties applied are extremely high in comparison to the market value of the product, creating incentive for excise evasion. The Treasury report (2002) also emphasised that drastic increases in excise taxes in the absence of other regulatory and educational measures might only result in a driving alcohol consumption underground. Consumers could switch to the home-brew market, or it could encourage cross-border smuggling. What is the ideal level of excise taxes, from an illicit market perspective, is still up for debate. Unfortunately there has been little research done to date within South Africa that could inform this debate.

REFERENCES

ADELEKAN, M. date unknown. *Noncommercial Alcohol in Sub-Saharan Africa*.
ICAP Review 3: Noncommercial Alcohol in Three Regions.

ANDERSON, P., CHISHOLM, D. & FUHR, D. 2009. *Effectiveness and cost-effectiveness of policies and programmes to reduce the harm caused by alcohol*. Lancet 2009; 373: 2234–46.

BOOYSEN, J. 2012. Drinking them under the table. *Cape Argus*: 9 July 2012.

BOTHA, A. 2010. *Understanding alcohol availability: Noncommercial beverages*. In M. Grant & M. Leverton (Eds.), Working together to reduce harmful drinking (pp. 39-62). New York: Routledge.

CARRELS, M. 2005. Illegal brewing slips through legal loophole. *The Herald*: 17 May 2005.

ECONOMETRIX. 2013. *Economic impact of an advertising ban on alcoholic beverages*. South Africa.

GILLESPIE, R. 2011. Beware dangers of cheap illicit alcohol. *Business Day*: 14 February 2011.

HAWORTH, A., & SIMPSON, R. (Eds.). 2004. *Moonshine markets: Issues in unrecorded alcohol beverage production and consumption*. New York: Brunner-Routledge.

INTERNATIONAL CENTER FOR ALCOHOL STUDIES (ICAP). 2010.
Noncommercial Alcohol: Understanding the Informal Market. ICAP issues briefings. Washington, USA.

KIRK, P. 2001. Bootleg booze a health hazard. *Mail and Guardian*: 8 February 2001.

LACHENMEIER, D. W., REHM, J., & GMEL, G. 2007. *Surrogate alcohol: What do we know and where do we go?* Alcoholism: Clinical and Experimental Research, 31, 1613–1624.

LACHENMEIER, D. W., & REHM, J. 2009. *Unrecorded alcohol: A threat to public health?*
Addiction, 104, 875–877.

LACHENMEIER, D., TAYLOR, B. & REHM, J. 2011. *Alcohol under the radar: Do we have policy options regarding unrecorded alcohol?* International Journal of Drug Policy 22 (2011) 153–160.

LACHENMEIER, D. 2012. *Unrecorded and illicit alcohol*. WHO, Alcohol in the European Union, pgs 29-34.

LACHENMEIER, D., GMEL, G. & REHM, J. 2013. *Unrecorded alcohol consumption.* Chapter 15 of Alcohol: Science, Policy and Public Health. Edited by Peter Boyle, Paolo Boffetta, Albert B. Lowenfels, Harry Burns, Otis Brawley, Witold Zatonski, Jürgen Rehm.

LEIFMAN H 2001. *Estimations of unrecorded alcohol consumption levels and trends in 14 European countries.* Nordisk Alkohol- & Narkotika Tidskrift; 18(English Suppl.):54–70.

LESTER, A., ALLEN, E. & GFA CONSULTING GROUP. 2012. *SADC Review – Study into the illicit trade in excisable products with particular reference to alcohol and tobacco products.*
Presented to: SADC Secretariat in Gaborone, Botswana.

MAKHUBELE, J. 2012. *Social exclusion as a contributing factor for the addition of harmful substances to home-made alcohol: the case of Mopani District in Limpopo province, South Africa.* African Journal of Drug & Alcohol Studies, 11(1), 2012.

MACGREGOR, D. 2012. Backyard brew can be deadly. *Daily Dispatch*: 3 March 2012.

MTYALA, Q. 2009. *Toxic alcohol claims 3 more lives*. [online] Available: http://www.iol.co.za/news/south-africa/toxic-alcohol-claims-3-more-lives-1.455097#.UgYWYlOqTdl *[Accessed 10 August 2013]*

NORDLUND, S., & ÖSTERBERG, E. 2000. *Unrecorded alcohol consumption: Economics and its effects on alcohol control in the Nordic countries*. Addiction, 95(Suppl. 4), S551–S564.

PARRY C, MYERS B. & THIEDE M. 2003. *The case for an increased tax on alcohol in South Africa*. S Afr J Econ 2003; 71: 266–82.

PITSO JMN. 2007. *Field tales of hazardoues home brewed alcoholic beverages: the case of Selebi Phikwe, Botswana.* Afr J Drug Alcohol Stud 2007;6:89–103.

POMERLEAU, J., MCKEE, M., ROSE, R., HAERPFER, C. H., ROTMAN, P., & TUMANOV, S. 2008. *Hazardous alcohol drinking in the former Soviet Union: A cross-sectional study of eight countries*. Alcohol and Alcoholism, 43, 351–359.

RAZVODOVSKY, Y. 2010. *Unrecorded Alcohol Consumption: Quantitative Methods of Estimation. Alcoholism* 2010;46(1):15–24.

REHM, J., KANTERES, F. & LACHENMEIER, DW. 2010. *Unrecorded consumption, quality of alcohol and health consequences*. Drug Alcohol Rev 2010;29;426–436.

SIMON, D & SAPA. 2003. Police seize counterfeit alcohol worth R7,5m. *Star*: 22 October 2003.

SITHOLE, J. & JELU, M. 2006. Deadly brew is a killer! Beer has meths and snuff. *Daily Sun*: 9 February 2006.

SPIES, D. 2006. Police target taverns brewing illegal liquor. *The Herald*: 29 November 2006.

SOUTH AFRICAN NATIONAL TREASURY, TAX POLICY CHIEF DIRECTORATE. 2002. *The Taxation of Alcoholic Beverages in South Africa*, Final Report, August

SOUTH AFRICAN NATIONAL TREASURY. 2010. *Proposed Study into Illicit Trade in Tobacco Products (Cigarettes) and Alcoholic Beverages (Wine and Spirits).* Presentation at Africa Tax Forum, Cape Town, February.

THE STAR. 2000. Fake brandy sold to avoid liquor tax. *The Star*: 13 December 200.

TOBACCO TACTICS. 2013. *International Tax and Investment Center***.** [online] Available: http://www.tobaccotactics.org/index.php/International_Tax_and_Investment_Center *[Accessed 13 November 2013]*

TRUEN, S., RAMKOLOWAN, Y., CORRIGALL, J. & MATZOPOULOS, R. 2011. *Baseline study of the liquor industry including the impact of the National Liquor Act of 2003*. Report by DNA Economics for the Department of Trade and Industry.

WORLD HEALTH ORGANIZATION (WHO). 2011. *Global status report on alcohol and health*. Geneva, Switzerland.

THE ECONOMICS OF ALCOHOL POLICY IN SOUTH AFRICA

CHAPTER 10

Alcohol and Neighbouring Countries

LAWULE SHUMANE
EVAN BLECHER

ALCOHOL AND NEIGHBOURING COUNTRIES

1. INTRODUCTION

Alcohol is produced and consumed in South Africa's neighbouring countries. South Africa also trades in alcohol products with its neighbouring countries by exporting and importing alcoholic beverages. Different regulatory and tax environments are likely to impact this cross-border trade. Furthermore, given the highly integrated nature of Southern African economies, particularly in the Southern African Customs Union (SACU), a detailed analysis of trends in alcohol use as well as alcohol taxation informs the ongoing policy debate. As Blecher and Drope (2013) note for tobacco, regional economic integration can hinder or encourage the convergence of public health and economic policy and thus one should take note of the political, economic and health environment.

One of the most significant points of contention in the regional dynamics of alcohol markets is taxation. High excise taxes, resulting in large price differences between nations, may be seen by individuals as an opportunity to earn illicit profits by engaging in the illicit trade of alcohol products. Alcohol smuggling is the illegal trade of goods across international borders. The smuggling of alcohol leads to a decrease in government revenues and an increase in the levels of consumption, as the alcoholic beverage is sold at a lower price, making it affordable for more consumers (Lester et al., 2012).

Media reports suggest that ethyl alcohol is smuggled from sugar-rich countries like Mozambique and Swaziland into South Africa where it can be used in the production of counterfeit or even unregulated alcoholic beverages (Mabuza, 2012). Reports from the South African Government News Agency highlight the borders with Mozambique and Botswana as points of concern, though smuggling is not limited to these border points.[1] *The Times of Swaziland* reports on the tactics employed by smugglers to evade authorities (Zulu, 2010). Knowledge of the methods of smuggling is obviously important for the development by the South African authorities of counter-strategies against the illegal trade.

Spirits manufactured in Mozambique are smuggled into Zimbabwe, where they are said to retail for as little as US$ 2 for a 250ml bottle. These spirits are largely consumed by unemployed youth as they are a cheap product with a high alcohol content (Chimoio, 2012).[2] Duri (2010) reports that the smuggling of goods between Mozambique and Zimbabwe became a common occurrence in the period from 2000 to 2008 when Zimbabwe faced political and economic crises. Duri (2010), in his study of smuggling between Zimbabwe and Mozambique, also notes that smuggling beer from Mozambique to Zimbabwe was the result of Zimbabwe having low beer stocks. Although the Zimbabwe situation has improved, smuggling still continues. Chimoio reports that smuggling continues because of corrupt officials who accept bribes at the border posts (Chimoio, 2012). However, the focus on this chapter is not on illicit trade *per se*, since thus has been covered in detail in Chapter 9. This chapter covers alcohol taxation and prices in South Africa and its neighbouring states and also trends in alcohol use and misuse in South Africa and its neighbouring states.

[1] The smuggling from Botswana and Swaziland is not technically smuggling since these countries are part of the Southern African Customs Union.

[2] An alcohol brand from Mozambique, Tetacao, is the main culprit, and has a 43% alcohol.

2. ALCOHOL TAXES IN SOUTH AFRICA AND NEIGHBOURING STATES

Prices of alcoholic beverages reflect the costs of production and transportation, the margins earned by producers, importers, wholesalers and retailers, and the taxes levied on the alcoholic beverage. Because taxes affect prices, differences in national tax rates could lead to differences in prices. This, in turn, creates incentives for individuals to smuggle goods between countries as long as the perceived benefit for the individual is greater than the perceived cost (Karlsson et al., 2009). This section deals with the levels of taxation imposed by the South African government and the governments of neighbouring states on alcoholic beverages. The section considers excise taxes levied in countries sharing a border with South Africa as well as additional taxes levied on alcoholic beverages.

Tables 1 and 2 refer to data published by the respective countries for the 2013 financial year.

2.1 SOUTHERN AFRICAN CUSTOMS UNION (SACU)

SACU is a customs union that includes South Africa, Botswana, Lesotho, Namibia and Swaziland. Countries belonging to SACU levy the same level of excise taxes on alcoholic beverages. SACU countries levy a specific tax per litre for traditional beer, wine and other fermented beverages and per litre of absolute alcohol for malt beer, spirits, ethyl alcohol and both fortified and unfortified fermented beverages. The excise taxes are applied according to the principles of duty at source (DAS) (SARS, 2013). All excise taxes are pooled and the revenue is shared according to a formula. This allows all excise taxes to be paid at the point of production and the free movement of goods between the countries. While the specific taxes are the same across countries in the SACU, each country levies VAT or GST at a rate of their own. Other costs or margins in the supply chain, as well as other marketing factors, are also likely to be different. This means that even though tax rates are identical different total tax burdens and retail prices are likely to be experienced.

The highest tax rate passed is on spirits and ethyl alcohol and the lowest rate is passed on unfortified still wine. A benefit of the specific tax regime is that it directly taxes the consumption of the undesirable good (alcohol) although it does not tax the value the consumer places on the good (Bird et al., 2010).

The burden of total tax (excise and VAT) on alcohol in South Africa is 23%, 35% and 48% of the average retail price for wine, clear beer and spirits respectively and had increased from 33% and 43% on beer and spirits, but now on wine, in 2012, respectively (Deloitte, 2013). For Namibia, Lester et al. (2012) report that the burden of alcohol taxes for clear beer and spirits, as a percentage of average retail selling price, is 29% and 48%, respectively. Also noted by the authors is that the tax burden has remained roughly constant for the year. South Africa and Namibia are the only countries which do not levy additional taxes on alcohol, as standard rates of 14% and 15% VAT on goods and services is applied in these countries respectively.

In 2012, Swaziland reported a tax burden of 33.7% for clear beer and 51.7% for spirits (Lester et al., 2012), most likely because of the high rate of GST in Swaziland (30%). Swaziland previously applied a general sales tax (GST) for alcoholic beverages of 30% on the cost of production for domestically produced goods (SMoF, 2011). In 2012, Swaziland abandoned their GST regime and adopted a value-added tax (VAT) system. The VAT charges on alcohol are 14%. The government had further planned to institute a specific levy on alcohol to compensate for the difference in the GST and VAT rates but this has not yet been done (SMoF, 2012).

In addition to excise taxes levied by SACU, individual countries of the Union levy other taxes. Botswana passed a law in 2008, which allowed an ad valorem levy of 30% to be passed on alcoholic beverages. On 1 December 2010, the alcohol levy was increased to 40% (Pitso et al., 2011). The levy is charged on the cost

of production for domestically produced beverages, while for imports the levy is charged on the cost, insurance and freight (CIF) value.[3] Botswana is the only country among the countries under analysis that imposes an alcohol levy. Defining it as a levy rather than an excise tax allows Botswana to raise its effective tax above the SACU level and also allows them to enjoy the revenue from this levy since it is not included in the excise tax revenue sharing pool. Botswana taxes all alcoholic beverages at a standard VAT rate of 12%.

Lesotho levies a standard VAT rate of 14% on goods and services; however, a rate of 15% is levied on the import and supply of all alcoholic beverages (Lephoto, 2005).

2.2 MOZAMBIQUE

Mozambique applies *ad valorem* excise taxes to the ex-factory price for domestically produced alcohol and on the CIF value for imported alcohol (Greenbaum, 2008). The highest rate, of 75%, is charged on spirits, increasing from 65% in 2013. All other beverages, with the exception of beer were increased to 55% from 40%. Beer is charged a 40% *ad valorem* rate which remained unchanged when other products saw excise tax increases in recent years. The Mozambique Ministry of Finance suggests that beer taxes have been left unchanged because of plans to stimulate the agricultural sector. These plans include brewing a domestic beer with locally grown cassava, which will provide a market for cassava farmers (Mozambique Government, 2011).

2.3 ZIMBABWE

The Zimbabwean government applies a combination of *ad valorem* and specific rates in its excise tax policy. The *ad valorem* taxes are applied at the discretion of the Zimbabwe Revenue Authority Commissioner. The following criteria are applied for the selection: a tax is levied on the cost of production plus 25% of the cost or the tax is levied on the selling price of the alcoholic beverage at the factory. The taxes levied capture some of the manufactures profit margin. The commissioner chooses the highest value offered (Customs and Excise Act 2010). The Zimbabwean government increased the excise rate of beer from 40% to 45%, on the commissioner's choice of base, in 2012 (ZMoF, 2012).

A problem noted by the Zimbabwean government is that alcohol imports are relatively cheaper than domestically produced beverages, particularly in the case of beer. To prevent consumers from substituting away from domestically produced beer, higher taxes have been levied on imported beer (ZMOF, 2012). This suggests that the Zimbabwean alcohol taxes are aimed more towards protecting the domestic industry than curbing alcohol use.

Zimbabwe applies a general VAT rate of 15% across the economy; however, spirits distilled from grape wine are taxed at 17.5%. These rates are provided on the Zimbabwe Revenue Authority (ZimRA) website. Zimbabwe further imposes a surtax of 15% on opaque beer and 25% on malt beer. The surtax rates are applied on the same base as the excise rates.

2.4 DISCUSSION

A notable difference between the excise taxes in SACU countries and those in Zimbabwe and Mozambique is the tax structure. While SACU countries apply specific taxes to all alcohol products, Mozambique applies *ad valorem* taxes to all alcohol products and Zimbabwe applies *ad valorem* taxes to some products, particularly beer. This makes comparison between products difficult and even comparison based on the tax

[3] A statement from an agent of the Botswana Revenue Authority official.

burden (i.e. the tax share in price) does not imply a similar value of tax. It is this value of tax that drives prices and hence price differences between countries.

TABLE 1: ALCOHOL EXCISE TAXES IN NEIGHBOURING COUNTRIES

ALCOHOL TYPE	Mozambique[4]		SACU		Zimbabwe[5]		
	Rate	Base	Rate	Unit	Rate	Unit	Base[6]
Beer							
Traditional beer	40%	Ex-factory; CIF	0.84 USD	Litre	45%		Commissioner
Malt beer	40%	Ex-factory; CIF	6.87 USD	Litre AA	45%		Commissioner
Wine							
Unfortified still	55%	Ex-factory; CIF	0.29 USD	Litre	0.40 USD	Litre	
Fortified still	55%	Ex-factory; CIF	0.52 USD	Litre	0.40 USD	Litre	
Sparkling	55%	Ex-factory; CIF	0.89 USD	Litre	0.40 USD	Litre	
Other fermented beverages							
Unfortified	55%	Ex-factory; CIF	6.87 USD	Litre AA			
Fortified	55%	Ex-factory; CIF	5.40 USD	Litre AA			
Other	55%	Ex-factory; CIF	0.62 USD	Litre			
Spirits							
Non-Liqueurs	75%	Ex-factory; CIF	13.23 USD	Litre AA			
Liqueur	75%	Ex-factory; CIF	5.40 USD	Litre AA	2.00 USD	Litre	
Ethyl alcohol							
Undenatured7			13.23 USD	Litre AA	2.00 USD	Litre	
Denatured			13.23 USD	Litre AA			

Note: Litre AA denotes per litre of absolute alcohol

TABLE 2: ADDITIONAL TAXES CHARGED ON ALCOHOLIC BEVERAGES

COUNTRY	Type of tax			
	VAT	Alcohol levy	Surtax	Base
Botswana	12%	40%		CIF; Cost of production
Lesotho	15%			
Mozambique	17%			
Namibia	15%			
South Africa	14%			
Swaziland	14%			
Zimbabwe	15%-17.5%		15%-25%	Commissioner

3. ALCOHOL PRICES IN SOUTH AFRICA AND ITS NEIGHBOURING STATES

While taxes are the tool which governments use to influence consumption trends, it is the influence on prices that is important since consumers respond to prices and not to taxes directly. The analysis of prices is

[4] Source http://www.at.14%gov.mz/legislad/

[5] Source: Lester et al., 2012 (15%-17.5% (all except beer)); Zimbabwe Budget Speech, 2012.

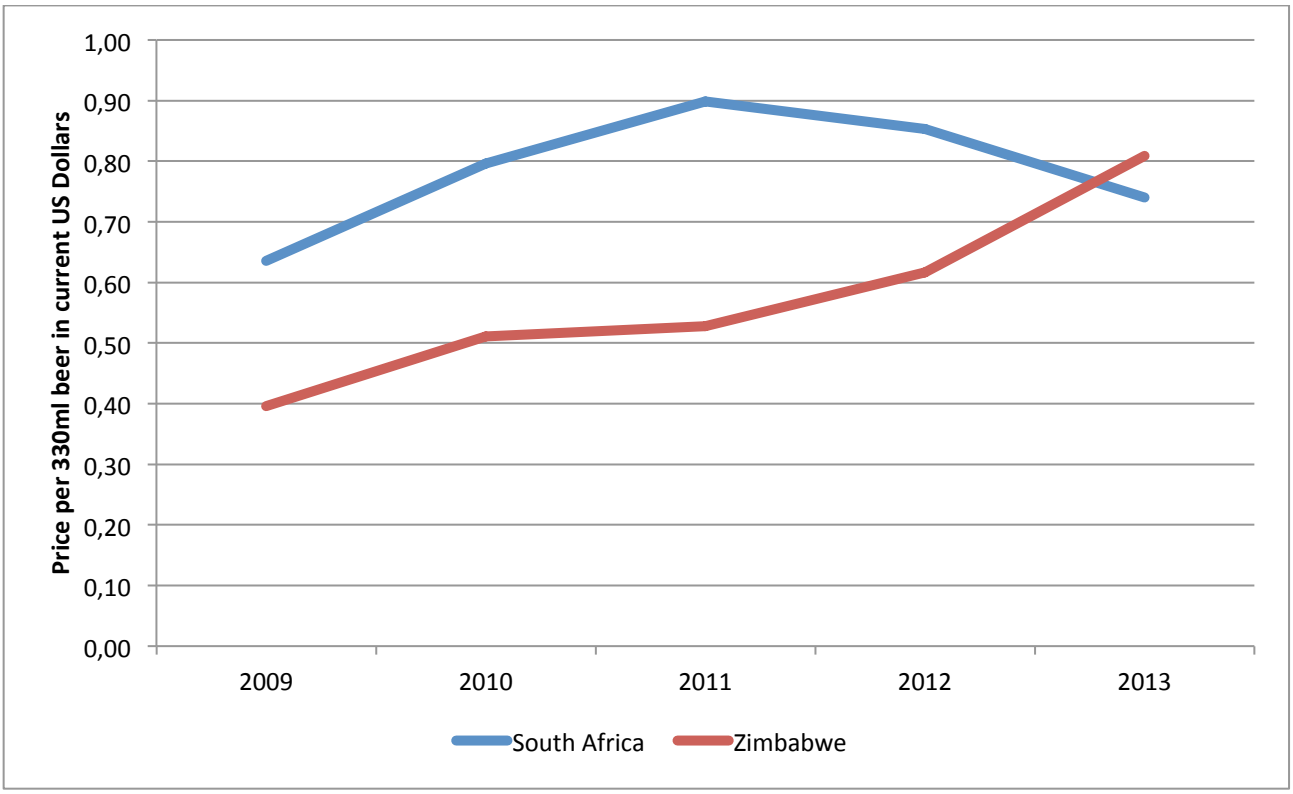
[6] Zimbabwean Surtax and Excise regulations dictate that the Zimbabwean Revenue Authority Commissioner will base the taxes on the "factory cost plus 25% or the selling price", whichever amount is greater (Zimbabwe Customs and Excise Act 2010, subsection 116).

[7] Alcohol strength >80%

constrained by the unavailability of recent price data for countries in the Southern African region. However, we are able to use two methods to attempt to overcome the unavailability of data and to shed some light on the differences in prices between South Africa and its neighbours. The first of these methods uses Economist Intelligence Unit (EIU) data for South Africa and Zimbabwe over 5 years; the second method looks at inflation rates for alcoholic beverages in South Africa and Namibia to see how prices have been changing over time in these economies. Data for other countries are unavailable.

The EIU collects data on pricing information of various goods and services across 123 cities in 79 countries (EIU, 2013). In the Southern African region, prices are only collected in South Africa and Zimbabwe and on a city level (Johannesburg and Harare). These data are used extensively in Chapter 6 and are discussed in more detail there.[8] The analysis begins in 2009, the period when Zimbabwe overcame hyper-inflation and began using the United States Dollar as the *de facto* currency. Alcohol prices in South Africa have been converted to the USD at the prevailing average annual exchange rate for the respective years.[9] Figures 1 to 3 show the prices of beer, wine and spirits separately. For spirits we consider only the prices of gin and whisky, following the convention of the affordability chapter.

FIGURE 1: *PRICES OF BEER IN SOUTH AFRICA AND ZIMBABWE*



Source: Economist Intelligence Unit

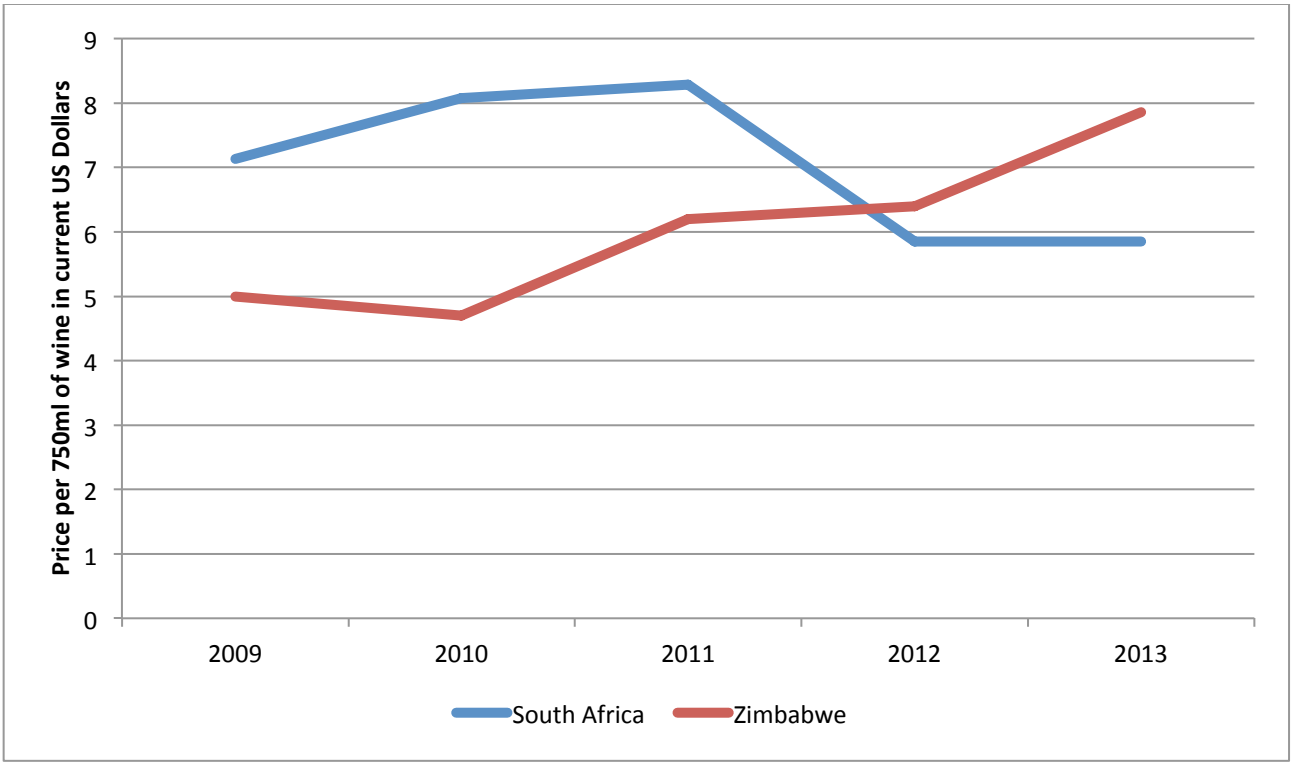
Figure 1 shows that beer prices have been rising consistently in Zimbabwe and rose from 2009 to 2011 in South Africa. However, beer prices have fallen in South Africa since 2011. Beer prices in Zimbabwe were lower than in South Africa until 2013 when they increased above those in South Africa.

[8] Data for Pretoria were also collected but we have excluded it for the sake of simplicity.

[9]

Year	2009	2010	2011	2012	2013
ZAR/$	8.40	7.30	7.23	8.20	9.46

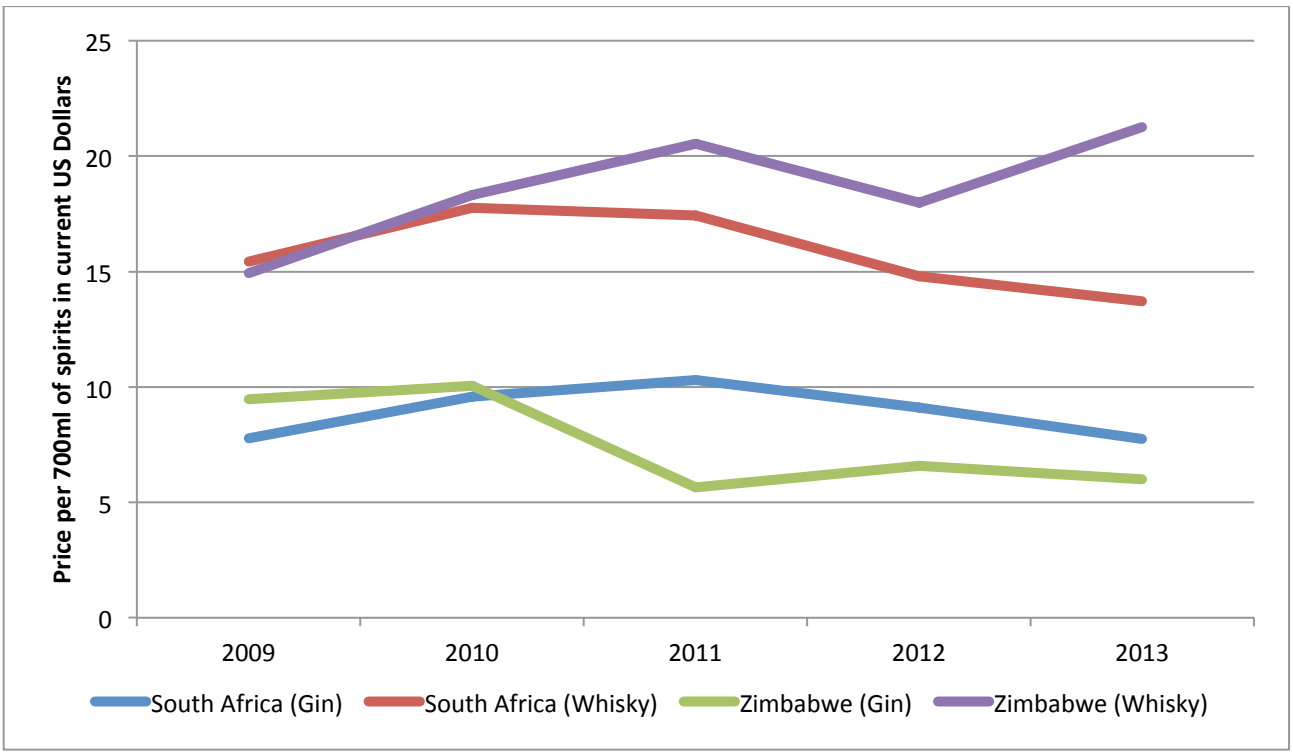
FIGURE 2: PRICES OF WINE IN SOUTH AFRICA AND ZIMBABWE



Source: Economist Intelligence Unit

Wine prices in Zimbabwe have been increasing consistently between 2009 and 2013, while South African wine prices increased from 2009 to 2011 and then declined significantly from 2011 to 2012, thereafter remaining stable. Although wine prices were lower in Zimbabwe than South Africa through 2011, since then wine prices in Zimbabwe have increased above South Africa's.

FIGURE 3: PRICES OF SPIRITS IN SOUTH AFRICA AND ZIMBABWE



Source: Economist Intelligence Unit

Whisky prices in South Africa and Zimbabwe were very similar in 2009 and 2010, as were gin prices. The trend in whisky prices has been upward in Zimbabwe, while whisky prices in South Africa rose initially, then fell in the latter years of the sample. By 2013, whisky was significantly more expensive in Zimbabwe than in South Africa. Gin prices fell in Zimbabwe fairly consistently, while South African gin prices increased until 2011 after which they declined slightly. However, gin is now more expensive in South Africa than in Zimbabwe.

The level of inflation in an economy informs us of the general increase in the prices of goods and services. As part of the Consumer Price Index, many countries publish sub-indices of important or highly consumed products, alcohol products being one of them. This provides us with a proxy of trends in alcohol prices in a country and the rate of increase in average alcohol prices can be observed. Table 3 shows the growth rate in nominal alcohol prices in South Africa and Namibia from 2004 to 2013.

TABLE 3: NOMINAL GROWTH IN ALCOHOL PRICES IN SOUTH AFRICA AND NAMIBIA

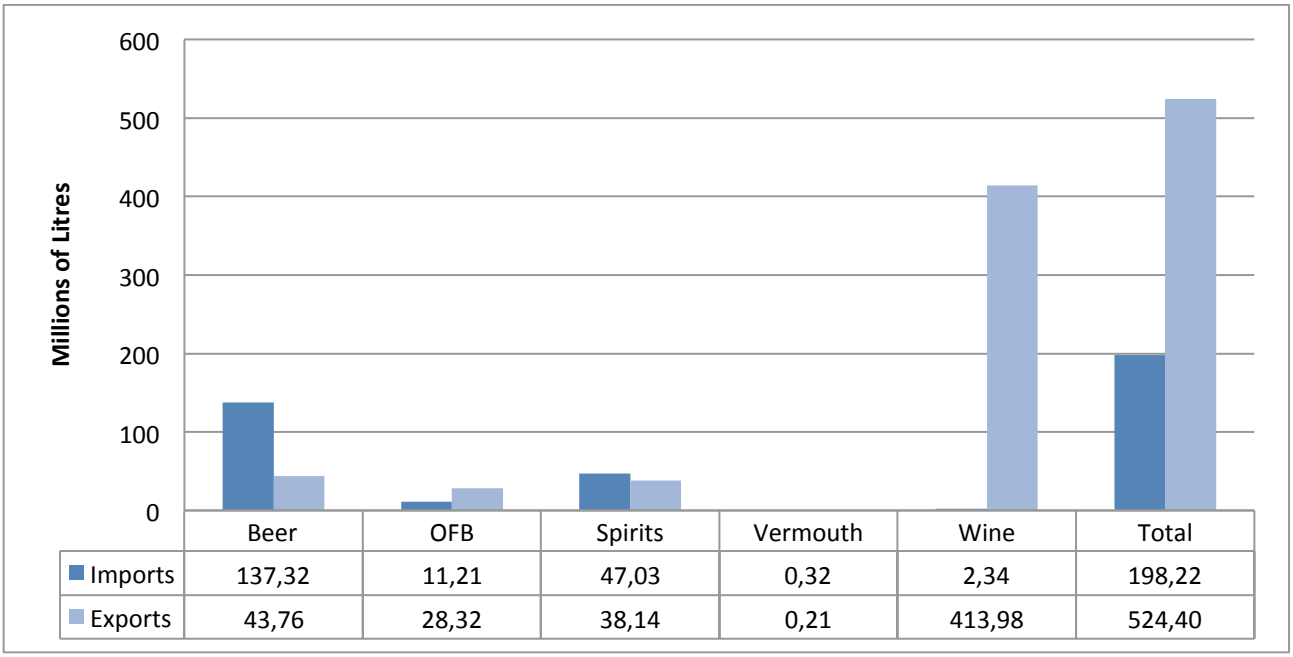
YEAR	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average
Namibia	8.5	5.3	6.4	6.4	9.3	10.1	7.5	5.8	11.1	9.6	8,0
South Africa	10.7	6.3	7.7	6.8	6.9	8.4	6.5	6.3	9.0	7.4	7.6

Source: Namibian Statistics Authority, Statistics South Africa & World Bank

Viewing the levels of annual growth in average alcohol prices in South Africa and Namibia, we note that alcohol prices have been rising at similar rates in both countries. This is to be expected given that both countries have the same excise tax rates and effectively share a common currency. However, between 2004 and 2007 South Africa had consistently higher alcohol price growth than Namibia, while between 2008 and 2010, and then again in 2012 and 2013, Namibia had consistently higher alcohol price growth than South Africa.

4. ALCOHOL TRADE FLOWS

FIGURE 4: ALCOHOL TRADE BETWEEN SOUTH AFRICA AND THE REST OF THE WORLD 2012[10]



	Beer	OFB	Spirits	Vermouth	Wine	Total
Imports	137,32	11,21	47,03	0,32	2,34	198,22
Exports	43,76	28,32	38,14	0,21	413,98	524,40

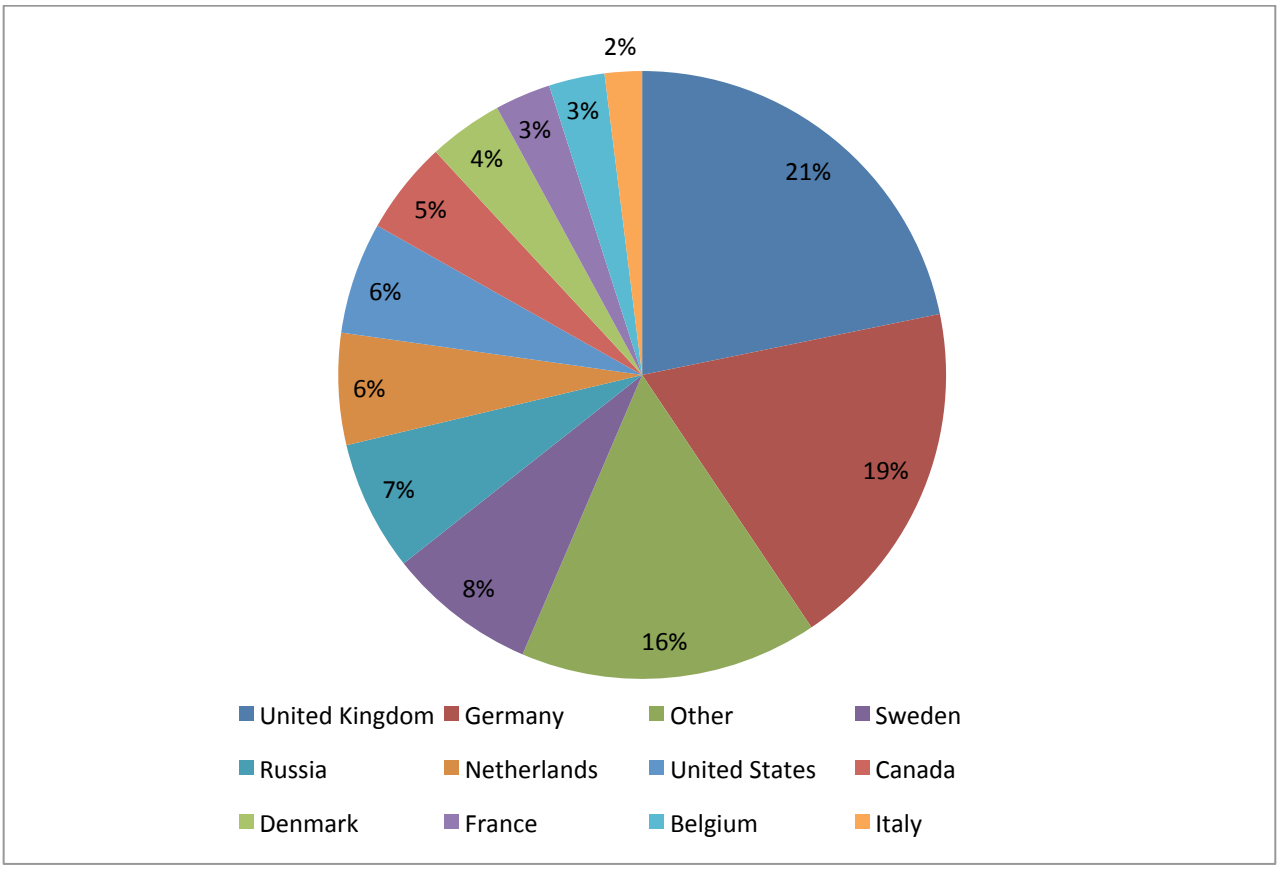
Source: Own calculations from data provided by the South African Revenue services, Namibian Statistics Agency & Trade Map.

[10] Data excludes other SACU nations.

Figure 4 illustrates the value of South Africa's trade in alcohol with the rest of the world. In 2012, South Africa was a net exporter of alcoholic beverages as it exported more than twice as much alcohol volume than it imported. Wine contributes 78.9% of total export volume, beer contributes 8.4%, spirits contribute 7.3%, other fermented beverages (OFB) contribute 5.4% and vermouth contributes 0.04%. South Africa is a net importer of spirits and beer from the rest of the world. Beer contributes a 69.3% of total import volume while spirits contribute 23.8% of total imports.

Given that wine significantly dominates export flows it is interesting to consider where we export that wine. The majority of South African wine is exported to Europe (Figure 5), specifically to European Union countries with which South Africa enjoys a Free Trade Agreement, and collectively accounts for 78% of wine exports. In 2012, the United Kingdom was South Africa's largest wine export destination, with 21% of total wine exports. All other wine export destinations (not included as South Africa's major wine export markets) account for 16% of South Africa's total wine exports.

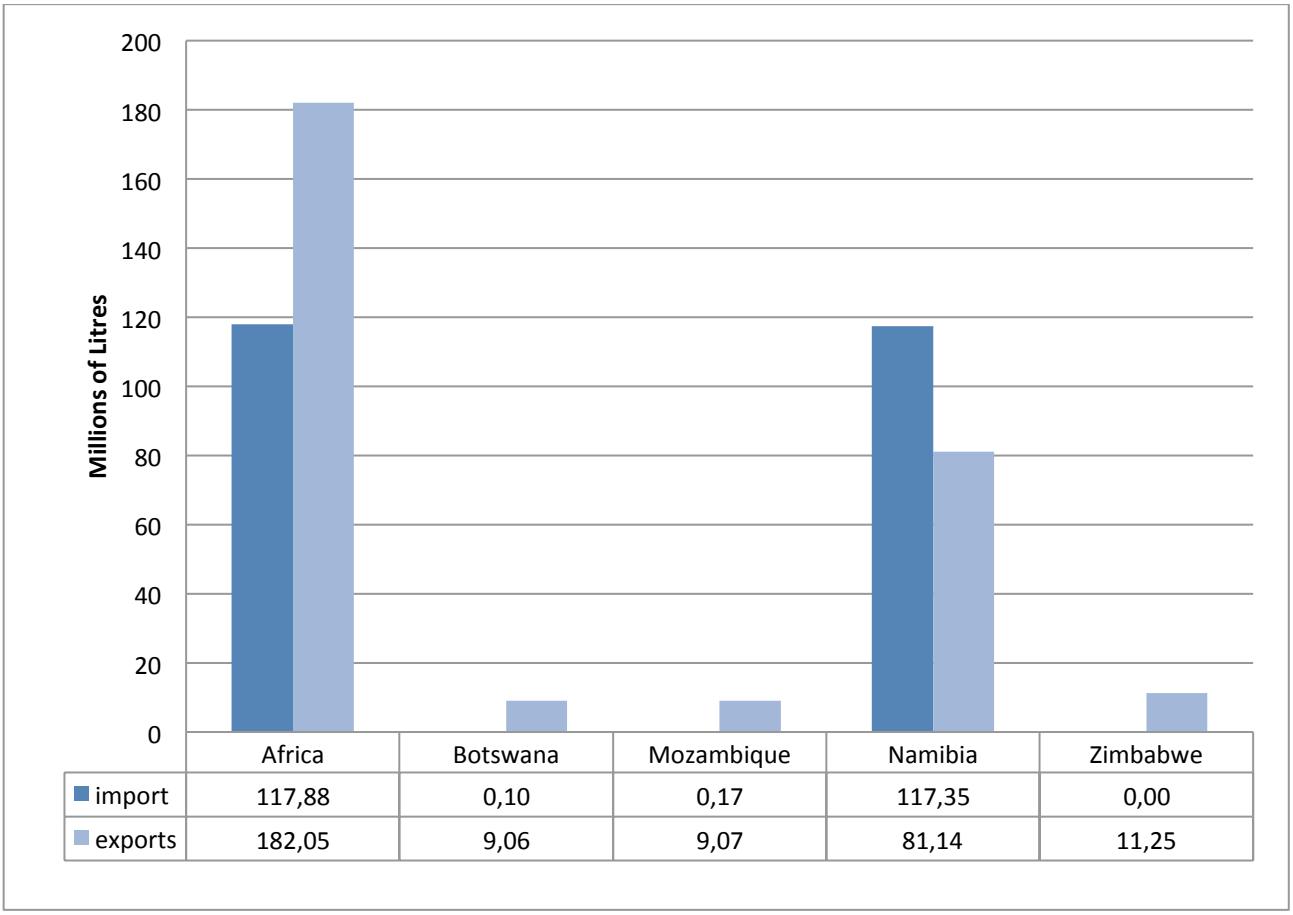
FIGURE 5: *INTERNATIONAL MARKETS FOR SOUTH AFRICAN WINE*



Source: GAIN Report, 2013

Figure 6 illustrates the volume of South Africa's trade with other African countries. South Africa imports very little alcohol from the rest of Africa, with the exception of Namibia. In alcohol trade, South Africa and Namibia have a strong relationship, as Namibia accounts for 99.6% of total import volume from African countries, mostly beer. All other African countries combined contribute less than 0.5% of imports. South Africa is a net alcohol exporter in Africa as it exports 54% more volume of alcohol than it imports. South Africa exports 60.7% of all its African alcohol exports to its neighbouring countries, while 39.3% is exported to other African countries. Of its neighbours, Namibia is South Africa's biggest export destination, accounting for about 44.6% of South Africa's alcohol exports. Zimbabwe is the second largest export destination, receiving 6.2% of alcohol exports.

FIGURE 6: ALCOHOL TRADE BETWEEN SOUTH AFRICA AND OTHER AFRICAN STATES IN 2012[11]



	Africa	Botswana	Mozambique	Namibia	Zimbabwe
import	117,88	0,10	0,17	117,35	0,00
exports	182,05	9,06	9,07	81,14	11,25

Source: Own calculations from data provided by the South African Revenue services, Namibian Statistics Agency & Trade Map.

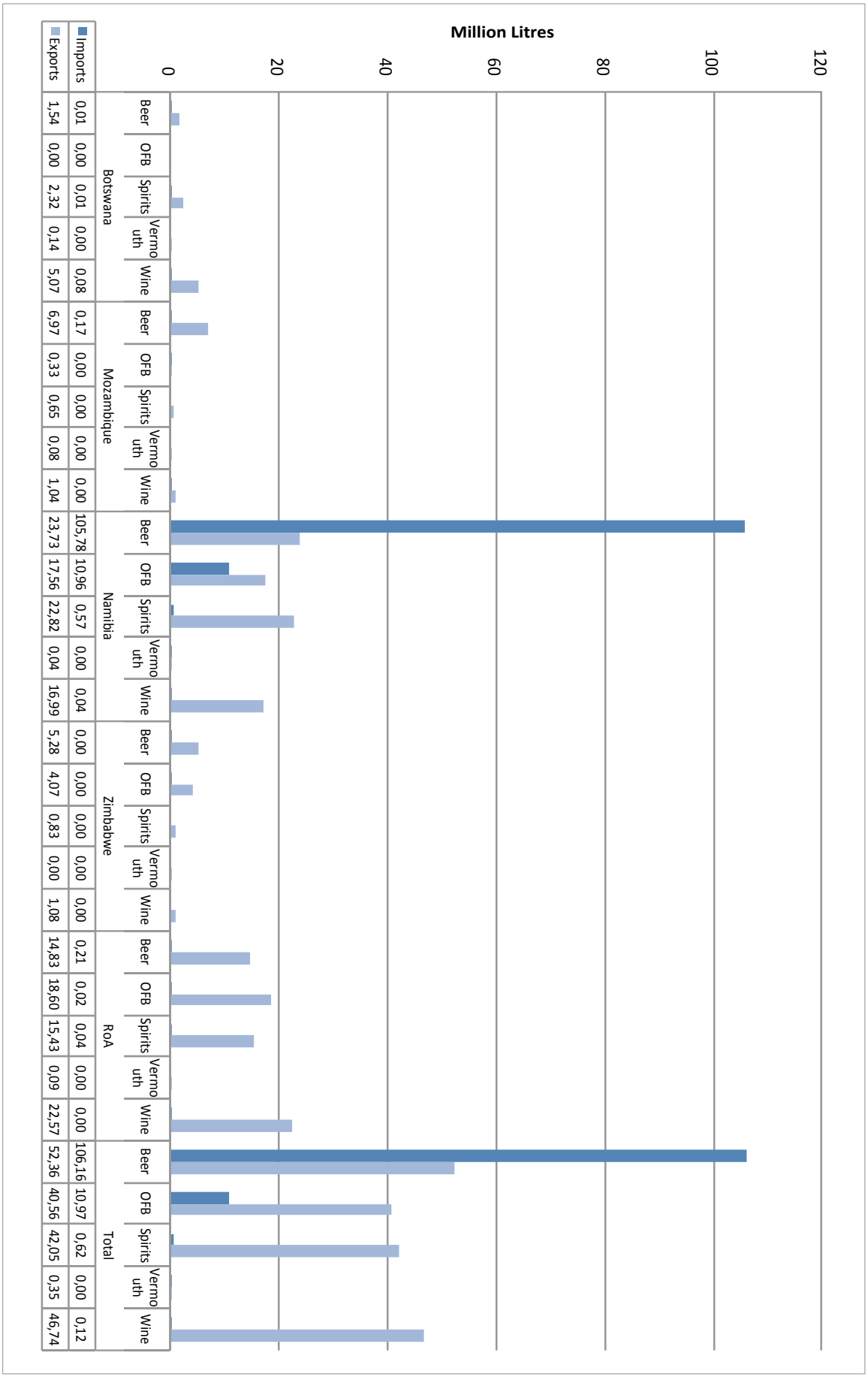
In 2012, South Africa was a net importer of beer and remained a significant net exporter of other types of alcohol. Most of the beer imported into South Africa from the African continent comes from Namibia. South Africa imports its second largest volume of beer from Mozambique although Mozambique remains a net importer of South African beer. Vermouth is the least traded alcoholic beverage between South Africa and other African states.

From a review of South African trade three dominant flows for different types of alcoholic beverages in South Africa can be noted:

- South Africa is a net importer of spirits from outside Africa; however, South Africa is a net exporter of spirits to other African countries
- South Africa is a net importer of beer from Namibia and the rest of the world
- South Africa is a net exporter of wine to Africa and the rest of the world.

[11] Data excludes Botswana, Lesotho and Swaziland.

FIGURE 7: SOUTH AFRICAN TRADE FLOWS WITH THE REST OF AFRICA BY PRODUCT



Source: Own calculations from data provided by the South African Revenue services, Namibian Statistics Agency & Trade Map.

5. LEVELS AND PATTERNS OF ALCOHOL CONSUMPTION IN SOUTH AFRICA AND NEIGHBOURING COUNTRIES

This section of the report reviews the levels and patterns of alcohol consumption in South Africa and its neighbours. We use data from the Global Information System on Alcohol and Health (GISAH) as used in the WHO Global Status Report on Alcohol and Health. Table 4 displays lifetime abstention rates for alcohol in the region using the most up-to-date data available from GISAH. Botswana and Mozambique have reported data from 2007, while other countries report data from 2003 and 2004. Lifetime abstention is defined as the number of adults (15 years+) who have never consumed alcohol.

***TABLE 4:** LIFETIME ABSTENTION RATES IN SOUTH AFRICA AND NEIGHBOURING COUNTRIES*

Country	Year	Male	Female	Total
Botswana	2007	34.4%	65.5%	50.2%
Lesotho	2004	28.2%	68.0%	50.3%
Mozambique	2007	29.7%	57.3%	44.4%
Namibia	2003	49.7%	69.2%	59.7%
South Africa	2004	51.0%	78.6%	65.2%
Swaziland	2003	53.5%	67.7%	61.0%
Zimbabwe	2003	58.1%	91.6%	75.2%

Source: Global Information System of Alcohol and Health

Zimbabwe has the highest total abstention rate while Mozambique has the lowest. South Africa has the second highest total abstention rate. Male abstention rates are lower than female abstention rates in all countries and significantly so. In Lesotho the female abstention rate is more than double that of men, while in Zimbabwe, nearly 92% of women have never consumed alcohol. Zimbabwe and Mozambique also have the highest and lowest female abstention rates, respectively, while among men Zimbabwe has the highest, and Lesotho the lowest abstention rates. South Africa has the second highest abstention rates among women and the third highest among men.

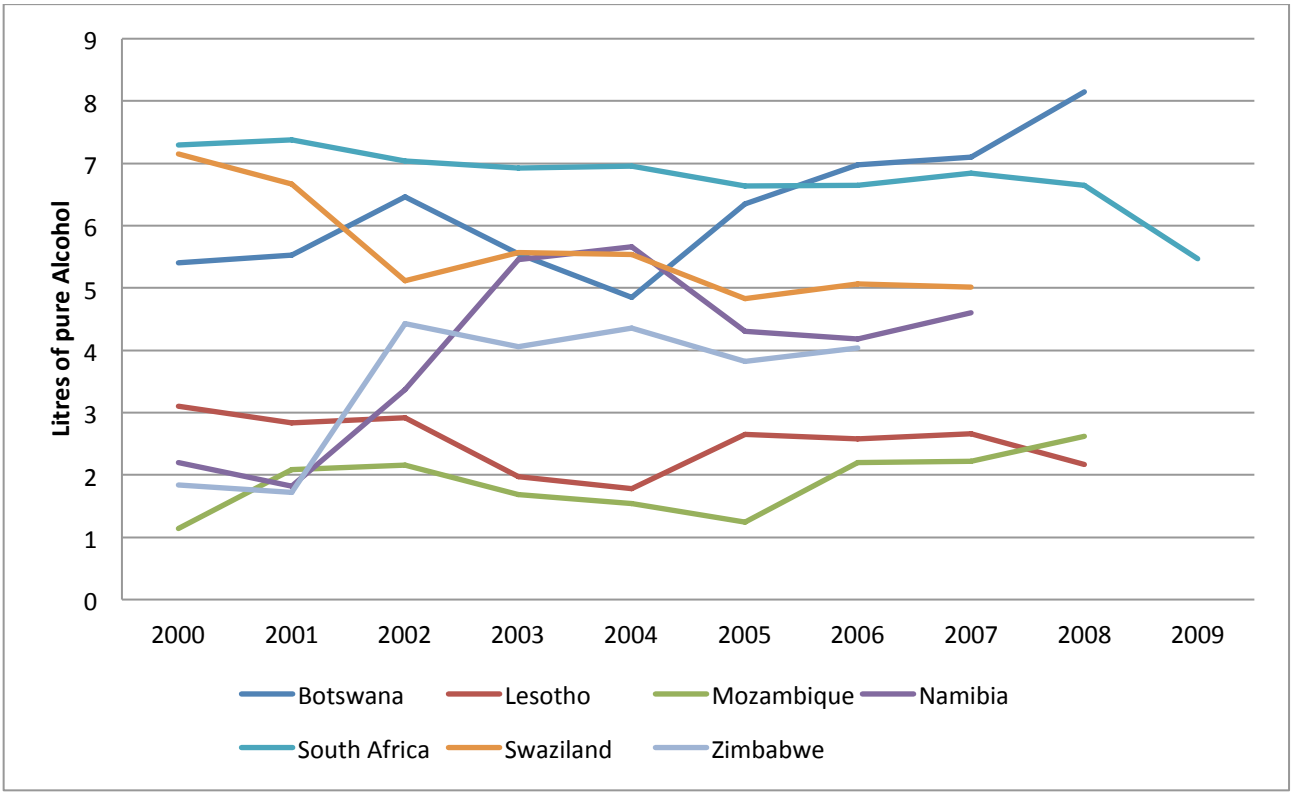
Reports from the Youth Risky Behaviour Survey (YRBS) place South Africa's lifetime abstention[12] amongst youth[13] at 49.6% in 2008. It was previously reported to be 49.1% in 2002. 12% of South African youth reported alcohol use initiation before the age of 13 (Ramsoomar et al., 2012). The rate of alcohol use amongst youth has remained relatively stable, with a change of only 0.5% between the two periods.

Figure 8 illustrates trends in *per capita* alcohol consumption levels, measured in litres of pure alcohol. South Africans consumed the most alcohol, among the various neighbouring states, for the period from 2000 to 2005. There is a downward trend in the levels of alcohol consumption in South Africa and Swaziland. Levels of alcohol use in Lesotho appear to be stable at between 2 and 3 litres of pure alcohol. Other countries report an upward trend, most prominent in Botswana. Botswana has the highest reported levels of litres of pure alcohol consumption *per capita*.

[12] Lifetime abstention in the YRBS means the individuals who had never consumed alcohol.

[13] YRBS is a survey conducted in South African Public Schools conducted in grades 8 - 11.

FIGURE 8: *LEVELS OF ALCOHOL CONSUMPTION IN SOUTH AFRICA AND NEIGHBOURING COUNTRIES*



Source: Global Information System of Alcohol and Health

6. ALCOHOL MISUSE IN SOUTH AFRICA AND NEIGHBOURING COUNTRIES

Weekly heavy episodic[14] drinking is used as a measure for the misuse of alcohol. The measure of heavy episodic drinking identifies the proportion of the adult population which consumes high levels of alcohol in one occasion. GISAH data is used and is shown in Table 5.

TABLE 5: *ADULT (15+ YEARS) WEEKLY HEAVY EPISODIC DRINKING[15]*

Country	Year	Male	Female
Botswana	2007	20.9%	4.4%
Lesotho	No data		
Mozambique	2007	27.2%	10.0%
Namibia	2003	10.3%	4.2%
South Africa	2003	18.4%	4.0%
Swaziland	2003	3.8%	1.0%
Zimbabwe	2003	10.1%	0.7%

Source: Global Information System of Alcohol and Health

[14] Heavy episodic drinking is defined as having 60 grams or more of pure alcohol in one occasion. This is equivalent to 3 *l* of beer or approximately 150 *ml* of spirits.

[15] Source: GISAH http://apps.who.int/gho/data/node.main.A1025?lang=en

The GISAH reports data for different time periods for the countries under analysis. Mozambique has the highest rates of weekly heavy episodic drinking for both men an women, while Swaziland has the lowest rates of weekly heavy episodic drinking for men, and Zimbabwe the lowest for woman. Weekly heavy episodic drinking is higher for men than women in all countries and by several orders of magnitude. South Africa's levels are higher than most countries, specifically, the third highest for men, and the fourth highest for women. Martinez et al. (2011) caution that female alcohol use and particularly heavy alcohol use is likely to be underreported because social norms. These include religious beliefs and social stigma specifically associated with female alcohol use.

Peltzer et al. (2011) report findings from a national South African survey which indicates that 17.0% of men and 2.9% of women had engaged in hazardous or harmful drinking.[16] They make use of the Alcohol Use Disorders Identification Test (AUDIT) to determine hazardous drinking. The paper, however, fails to report on the exact units of alcohol that determine heavy drinking. The authors acknowledge this by noting that AUDIT covers consumption, alcohol dependence and alcohol-related consequences which allow it to be comparable to the World Health Organization's concepts of hazardous drinking (Peltzer et al., 2011).

7. CONCLUSION

This chapter has considered cross-country trends in excise taxes and prices of alcohol products in South Africa and its neighbouring countries as well as cross-country trends in alcohol use and misuse in South Africa and its neighbouring countries. Cross-country trends in excise taxes and prices are important since critics of tax policy tools argue that higher taxes and prices in one country create incentives for traders to smuggle lower taxed and priced products across borders. While an earlier chapter considered the illicit trade in alcohol products in more detail and shows that this problem is far more complex than simply considering tax and price differentials, this chapter has considered the actual tax and price differentials. What is clear is that tax policy is already harmonized within the SACU countries. Only two neighbouring countries, Mozambique and Zimbabwe, are not within the harmonized zone. Additionally, Botswana levies taxes at significantly higher rates than South Africa and thus one would conceptually expect illicit alcohol products to flow out of South Africa and into Botswana. There is no claim, however, that this occurs. Mozambique and Zimbabwe have significantly different tax structures to the SACU countries, making a direct comparison of tax rates difficult. The reliance on *ad valorem* rates in Mozambique makes this comparison more problematic. In Zimbabwe, the specific tax rates are higher than SACU on some wines but lower on others. Additionally, the excise tax rate on ethyl alcohols is significantly lower in Zimbabwe than in the SACU countries. There is no clear evidence that alcohol is cheaper in Zimbabwe than South Africa and most recent evidence suggests that beer and wine are cheaper in South Africa than Zimbabwe, making smuggling from Zimbabwe to South Africa unprofitable and therefore unlikely.

The cross-country differences in alcohol use patterns in the region show that South Africans abstain from drinking at similar rates to their neighbours but also engage in similar rates of heavy episodic or dangerous drinking. This might suggest cross-border cultural, social or economic factors which influence patterns of alcohol use and misuse.

[16] South African National HIV Incidence, Behaviour and Communication Survey of 2008.

REFERENCES

Benza, B. 2010. Alcohol Levy: Consumers Desert local brews for imports. Mmegi Online, 26 November 2010. Vol. 27 No. 179. http://www.mmegi.bw/index.php?sid=4&aid=6853&dir=2010/november/friday26
[Accessed 10 July 2013]

Bird, R. & Wallace, S. 2010. Taxing Alcohol in Africa: Reflections and Updates. International Studies Program. Working Paper 10-31.

Blecher, E. & Drope, J. 2013 The rewards, risks and challenges of regional tobacco tax harmonization. Under review at Tobacco Control.

Chimoio, M. 2012. ZIMRA, ZRP Corruption Fuels Illicit Alcohol Boom. The Zimbabwean, 10 October 2012. http://www.thezimbabwean.co/news/zimbabwe/61424/zimra-zrp-corruption-fuels-illicit.html
[Accessed 1 July 2013]

Duri, F. 2010. Informal Negotiation of the Zimbabwe-Mozambique Border for Survival by Mutare's Marginalised People. Journal of Developing Societies, 2010, 26:125.

Deloitte. 2013. Unlocking Budget 2013/14- Consolidated Commentary.
http://www.deloitte.com/assets/DcomSouthAfrica/Local%20Assets/Documents/budget_consolidated_commentary.pdf
[Accessed 20 August 2013]

Global Agricultural Information Network. 2013. The South African Wine Industry: Production, Consumption and Trade.

Greenbaum, A. 2008. Analysis of Changes in the Excise Duties on Specific Goods in Mozambique.
http://www.tipmoz.com/library/resources/tipmoz_media/cat3_link_1219158235.pdf
[Accessed 15 August 2013]

Government of Mozambique. 2011. Parliament Amends Excise Rates.
http://www.portaldogoverno.gov.mz/news/folder_summary_view?b_start:int=3525
[Accessed 13 July 2013]

Karlsson, T. & Osterberg E. 2009. Alcohol Affordability and Cross-border Trade in Alcohol.
Swedish National Institute of Public Health.

Lephoto, L. 2005. Introduction of VAT in Lesotho.
http://www.centralbank.org.ls/publications/OtherPublications/Value_Added_Tax.pdf
[Accessed 15 August 2013]

Lester, A. & Allen, E. 2012. SADC Review – Study into the Illicit Trade in Excisable Products with articular reference to Alcohol and Tobacco Products.
http://www.sadc.int/files/3913/5895/1270/SADC_study_into_the_illicit_trade_in_excise_products.pdf
[Accessed 14 June 2013]

Mabuza, E. 2012. "Alleged illicit liquor dealer to face court". The Business Day, 10 July 2012.
http://www.ens.co.za/images/news/10July_BusinessDay_Alleged%20illicit%20liquor%20dealer%20to%20face%20court.pdf
[Accessed 1 July 2013]

Martinez, P. Roislien, J. Naidoo, N. & Clausen, T. 2011. Alcohol abstinence and drinking among African women: data from the World Health Surveys. BMC Public Health, 11:60.

Mozambique Tax Authority. 2013. http://www.at.gov.mz/legislad/Lei_2_2013.pdf
[Accessed 13 July 2013]

Peltzer, K., Davids, A. & Njuho, P. 2010. Alcohol use and problem drinking in South Africa: findings from a national population-based survey. African Journal of Psychiatry, 2010, 14: 30-37.

Pitso, J. & Obot, I. 2011. Botswana Alcohol Policy and the Presidential Levy Controversy. Addiction, 106, 898-905.

Ramsoomar, L. & Morojale N. 2012. Trends in alcohol prevalence, age of initiation and association with alcohol-related harm among South African youth: Implications for policy. The South African Medical Journal, 2012, 102(7).

South African Government News Agency, 2009. Government Works Hard to Prevent Illegal Smuggling of Goods. http://www.sanews.gov.za/africa/govt-works-hard-prevent-illegal-smuggling-goods
[Accessed 12 July 2013]

Southern African Development Community Secretariat.
http://www.sadc.int/information-services/tax-database
[Accessed 14 June 2013]

South African Revenue Services. http://www.sars.gov.za/AllDocs/LegalDoclib/SCEA1964/LAPD-LPrim-Tariff-2012-05%20-%20Schedule%20No%201%20Part%202A.pdf
[Accessed 10 July 2013]

South African Revenue Services. 2013. Excise – External Guide to Excise Duties and Levies.
http://www.sars.gov.za/AllDocs/OpsDocs/Guides/SEFS09%20%20Excise%20Duties%20and%20Levies%20-%20External%20Guide.pdf
[Accessed 15 August 2013]

Zimbabwe Ministry of Finance. 2012. The 2013 National Budget Statement.

Zimbabwe Revenue Authority. www.zimra.co.zw Accessed 14 June 2013.

Zulu, J. 2010. Smugglers Burn Vehicle to Evade Arrest. Times of Swaziland, 1 September 2010.
http://www.times.co.sz/index.php/index.php?news=18987&vote=5&aid=18987&Vote=Vote&output_type=txt&output_type=rss
[Accessed 12 July 2013]

THE ECONOMICS OF ALCOHOL POLICY IN SOUTH AFRICA

CHAPTER 11

Conclusion

EVAN BLECHER
CORNÉ VAN WALBEEK

CONCLUSION

Ever since wine was first produced in the Cape Colony in the 17th century, alcohol has played an important role in South Africa's history, culture, politics and economy. South Africa has a large and powerful alcohol industry with global reach. The industry employs large numbers of people in the primary, secondary and tertiary sectors of the economy.

This report considers the economics of alcohol use, abuse and policy in South Africa. It was commissioned by the World Health Organization South Africa country office to inform the current debate around alcohol control policy in South Africa and to support the development of policies that aim to reduce the externalities related to the harmful use of alcohol in South Africa.

Alcohol confers undeniable social benefits to moderate drinkers and plays an important role in the South African economy, as a source of employment across a wide range of sectors, a contributor to GDP, a source of foreign exchange earnings, and a source of revenue for the government. On the other hand, the abuse of alcohol imposes a large cost on society, both pecuniary and non-pecuniary, in the form of, amongst other things, premature mortality of drinkers and innocent third parties, medical costs, and costs from crime, spousal abuse, neglect of children and the disintegration of families.

Alcohol policy is multidimensional and complex. No credible organization or interest group is calling for the abolition of alcohol use. The misguided Abolition in the United States in the early years of the 20th century still acts a warning to legislators against social intervention policies that could have very detrimental, albeit unintended, side effects. The current argument is about curbing the harmful use of alcohol and minimizing the negative externalities that it imposes on society, with the least possible negative effect on responsible drinking. This report falls in that genre.

All countries restrict the sale and use of alcohol in a number of ways. For example, in South Africa municipal by-laws restrict alcohol sales to certain days of the week and certain times of the day. Alcohol may not be sold to minors. Furthermore, the negative externalities associated with alcohol abuse are addressed through legislation curbing drunken driving, and enforced through sobriety checkpoints, administrative license suspensions and graduated licensing for novice drivers.

Recently the Minister of Health has introduced legislation to restrict alcohol advertising significantly. The aim of this legislation is to reduce the appeal of alcohol, especially to the youth, and ultimately to reduce some of the negative externalities associated with alcohol abuse. This intervention is fiercely opposed by the alcohol and advertising industries, and even by some departments within government. High-pitched warnings of the negative consequences of the intended legislation are regularly made in the media by the alcohol industry and people and organisations who speak on their behalf. Even though the proposed advertising restrictions are important, and have obvious economic dimensions, it was agreed at the outset that the proposed alcohol advertising restrictions do not fall within the ambit of the current study.

Rather, this report considers one dimension of alcohol policy in substantial detail, namely the use of tax and price increases as a mechanism to reduce alcohol abuse. In the same way that there is a general consensus that substantial and regular increases in the excise tax on tobacco products are the best way to reduce tobacco use (IARC, 2011), there is increasing support for the idea that an increase in the alcohol taxes and prices are effective in reducing harmful alcohol use.

Increasing the excise tax or imposing minimum retail prices on alcohol has recently received the endorsement from an unexpected source, namely The Economist (December 2013). This well-respected

publication, known for its liberal economic views and general disdain of any government intervention, strongly supported a recent initiative in Scotland to impose a minimum retail price on alcohol. The Economist quoted statistics on the increased use of alcohol abuse in a number of European countries and argued that interventions that make alcohol less affordable should be implemented to reduce alcohol abuse. Using increases in the excise tax as a measure to reduce the use of products with socially undesirable side effects is no longer seen as extremist and paternalistic, as was the case two or three decades ago, but is becoming part of mainstream, even liberal, economic thinking.

This report considers the trends in alcohol prevalence in South Africa by product, gender, race, geography and economic status. Alcohol is not used universally in South Africa. In fact, most South Africans do not consume alcohol at all. This means that a very large number of people who do not consume alcohol ultimately face many of the externalities linked to alcohol abuse. There are considerable socio-economic gradients to alcohol use. For example, consumption of beer (the most used alcohol product in South Africa) is heavily slanted towards men. For nearly all alcohol products, prevalence of use among men is higher than among women. While some traditional alcohol products have experienced stable and sometimes even decreasing trends in consumption, there has been very sharp growth in the prevalence of use of "fashionable" and "modern" products (such as whisky and flavoured alcoholic beverages), especially amongst Africans, the youth and women.

The harm associated with alcohol abuse in South Africa is significant. South Africa has one of the highest per drinker levels of alcohol consumption in the world and a "pattern of drinking" similar to those of countries notorious for their heavy drinking, such as Kazakhstan, Mexico, the Russian Federation and the Ukraine. This indicates that there is greater harm per litre of alcohol consumed in South Africa than in other regions where drinking prevalence may be more widespread but where harmful use is rare. As a consequence, South Africa experiences alcohol-related costs and externalities above global averages, especially in the area of acute conditions. These externalities include direct and indirect economic costs, such as healthcare costs, justice costs and productivity losses. This is in addition to the massive social costs that alcohol abuse causes. Given the existing strain on the health system from a high burden of infectious diseases and existing health inequalities, there is a strong case for the government to intervene to reduce these costs.

There are effective and appropriate economic policy interventions to reduce the effects of the harmful use of alcohol. Basic economic theory teaches us that an increase in the price of a product reduces the quantity demanded. Governments are able to increase the prices of products through taxation. There is a large international literature that describes the relationship between alcohol prices and alcohol consumption. The consistent conclusion is that an increase in the price of alcohol reduces consumption. Furthermore, the demand for alcohol is found to be relatively price inelastic. This means that alcohol consumption decreases by a smaller percentage than the percentage increase in the price. Using data from a large cross-sectional study, we found that, for the population as a whole, the price elasticity of alcohol in South Africa is about -0.52. This implies that, holding all other factors constant, a 10% increase in the price of alcohol would reduce total alcohol consumption by about 5.2%. This price elasticity estimate corresponds well to the price elasticity estimates found in other countries.

An increase in the excise tax which increases the price of alcohol will result in reduced consumption, and, at the same time, increase total tax revenues. The latter result follows because the decline in consumption will be less than proportional to the increase in the excise tax. Thus, tax increases can have two important benefits for government; firstly, to reduce consumption and thereby reduce the externalities associated

with harmful alcohol use, and secondly, to increase revenue to compensate government for the costs associated with these externalities.

In addition to estimating aggregate price elasticities (i.e. those that apply to the population as a whole), we estimated elasticities based on income group and heaviness of drinking. We found that the poor reduce their alcohol consumption by a greater percentage in response to an increase in the price of alcohol than the rich. To the extent that alcohol use among the poor is regarded as a problem, this is an important finding, because an increase in the price of alcohol will have a greater impact on the poor than on the more affluent. We also found that moderately drinking households are more price sensitive than heavy drinking households. Thus, an increase in the price of alcohol is not as effective as reducing alcohol consumption amongst heavy drinkers as amongst moderate drinkers. However, an increase in the price of alcohol is not completely impotent. We estimate that a 10% price increase reduces alcohol consumption amongst heavy drinking households by 2.7%. Furthermore, an increase in the price of alcohol is likely to reduce the number of current moderate drinkers developing into heavy drinkers.

While taxes are the tool that governments use, it is their effect on prices which is important. Consumers' purchasing behavior is determined by the retail price of the product, not by the amount of tax that they pay. In fact, the average drinker has little to no idea about the amount of tax they paid on their last drink, but they will likely know the price they paid.

Since 2001 the recorded retail prices of most alcohol products have experienced sizeable increases, even accounting for the effects of inflation. When the government increases the excise tax, the increase is usually passed on to consumers in the form of higher retail prices nearly immediately. This implies that, at least based on historical precedent, an increase in the excise tax is an effective tool in reducing consumption. For some products and some time periods, the absolute increase in the retail price is greater than the absolute increase in the excise tax. In such cases the tax is "overshifted". Overshifting of the tax improves the effectiveness of the tax as a means to reduce consumption, because consumers face a higher retail price than had been the case had the tax not been overshifted.

However, even though the price of alcohol in South Africa has increased in real (i.e. inflation-adjusted) terms, increases in consumers' average incomes can offset this effect. In fact, it is quite possible that a product can become more expensive (in the sense that the real price is increasing), and at the same time more affordable (if income increases faster than the increase in the real price). Affordability incorporates the effect of both price and income changes on consumers' ability to buy a product.

We found that beer, wine and spirits in South Africa have generally become more affordable over time, despite the increase in real prices. Furthermore, a comparison with a large sample of countries shows that South Africa has amongst the cheapest and most affordable alcohol products in the low- and middle-income world and that alcohol products are cheaper and more affordable in South Africa than some high-income countries. The ability of tax policy to target specifically the affordability of alcohol products would be an important step in reducing the harm caused by alcohol in South Africa.

The South African government has imposed excise taxes for many decades (and in the case of beer and spirits for more than a century) and the idea that this is "normal" is well-entrenched. The tax is levied as a specific tax. For wine, sorghum beer and ready-to-drinks, the tax is levied on the volume of the beverage, while for beer and spirits the tax is levied on the volume of absolute alcohol. Focusing the basis of taxation on the volume of absolute alcohol is smart in that it effectively discourages larger doses of alcohol and creates incentives for producers to produce products with lower alcohol level. As such, it creates a positive incentive to reduce alcohol abuse.

Since 2002 the Treasury has set targets for the total tax burden for each of the three alcohol categories. The total tax burden is defined as the sum of the excise tax and the VAT amount, expressed as a percentage of the average retail price of that alcohol category. The original tax burden target for beer was 33%, and was increased to 35% in 2012. For wine the target was initially set at 23%, and it has remained at 23% ever since. For spirits the target was set at 43% in 2002, and was increased to 48% in 2012. Based on current excise taxes, the average retail price for beer (5% alcohol content) should be R4.78 per 340 ml can; the average retail price of wine should be R18.93 per 750 ml bottle and the average retail price of spirits (43% alcohol content) should be R110.93 per 750 ml bottle. It is difficult to evaluate whether the average retail price of wine and spirits approximate these values, given the large differences in the prices of these two alcohol categories. However, for beer, the average retail price is higher than the equivalent of R4.78 per 340 ml can (even accounting for volume discounts), which implies that the effective tax burden on beer is less than the targeted 35%. An increase in the excise tax is required to achieve the targeted total tax burden percentage.

Targeting the total tax burden creates a natural hedge against inflation and ensures that the specific taxes maintain their value over time. In the late 1970s and especially the 1980s the real value of the excise tax on alcohol was greatly eroded by the high inflation of that period. The decrease in the real alcohol excise tax was so large that, despite the 32% increase in the real excise tax on beer and the 87% increase in the real excise tax on spirits since 1990, the real excise tax on these two categories is currently substantially lower than their peaks in the late 1960s.

Despite the obvious benefit as a hedge against inflation, setting the excise tax as a percentage of the retail price gives significant power to producers to control the rate of growth in the value of taxes. The official policy of the Treasury is to increase the specific excise tax by either the amount required to maintain the targeted total tax burden, or by the inflation rate, whichever is the higher. This passive approach to adjusting the excise tax on alcohol has the advantage that it is predictable to all parties and does not require annual negotiations between the Treasury and industry. However, a very significant drawback is that the Treasury's ability to influence public health through discretionary increases in the alcohol excise tax is greatly reduced. Should the Treasury wish to change the targeted tax burden percentages, this would require a policy change, as was made before the new targets were announced in the 2012 budget.

Comparing trends in alcohol excise taxes and prices to cigarette taxes and prices is relevant given that both products result in significant externalities for users and non-users, but also because governments in many countries use excise taxes as a mechanism to reduce the externalities and recover costs. South Africa has used alcohol and tobacco excise taxes for this purpose for a long period of time. The Treasury has been increasing taxes on both since the early 1990s, but the increase in tobacco taxation has been much greater than alcohol taxation. As a result, tobacco consumption in South Africa has dropped sharply, while alcohol use has not experienced the same declines.

When externalities vary across units consumed but a uniform tax is imposed to avoid costly or unfeasible processes, the outcome can be improved by supplementing the tax with direct regulation on consumption. In order to address the negative externalities of alcohol, certain policies are recommended for South Africa. These include increases in the excise tax, stronger enforcement of drunk driving legislation, e.g. an increase in the number of sobriety checkpoints, administrative license suspensions and graduated licensing for novice drivers. Other strategies that have been recommended for South Africa include workplace interventions, broad-based community initiatives and specific interventions aimed at drunk pedestrians, drunk drivers and pregnant women. These interventions should be coupled with stronger enforcement of existing legislation and regulation of the market. However, all these interventions will occur at a significant

cost and administrative burden. Tax policy, on the other hand, will not impose any additional administrative costs as there is already a functioning tax collection system in place. Additional tax administrative measures to improve the integrity of the tax system will probably result in significant additional revenues.

Many opponents of tax policy argue that the tax increases will not have the intended consequences but will rather result in legal consumers shifting their consumption to illegal or untaxed products, thereby avoiding or evading the tax. While there is an existing illegal alcohol market in South Africa, it is far more complex than simply an illicit non-taxed market. Rather, it is a complex web of traditional and home-brewed alcohol products that are declining in use and unlikely ever to be the subject of taxation. Furthermore, existing tax evasion is likely the result of poor tax administration and enforcement. The incentive to smuggle alcohol from neighbouring countries is limited given that the prices in these countries are similar to those in South Africa. Through the Southern African Customs Union agreement an increase in the alcohol excise tax in South Africa simultaneously increases the excise tax in Botswana, Lesotho, Namibia and Swaziland.

South Africa's own experience with raising excise taxes on cigarettes has shown that even in the presence of significant volumes of illicit trade the policy goals of reduced smoking prevalence and higher tax revenues were not undermined. Smoking prevalence among adults is currently just more than 20%, significantly down from well above 30% in the early 1990s. Despite all the industry's claims that illicit trade is increasing and out of control, real government excise tax revenue from tobacco has increased in 17 of the past 20 years and is now more than 200% higher than it was 20 years ago. Furthermore, experience shows that the tobacco industry (and by extension, the alcohol industry) should not be the one who defines the narrative on illicit trade.

South Africa has an opportunity to reduce the harm caused by alcohol use through higher taxes and prices on alcohol products. The experience with tobacco control in South Africa should not go unnoticed. Excise tax policy, more than any other intervention (such as the ban on advertising and smoking in indoor public places), played a crucial role in reducing smoking prevalence. Importantly, increasing the excise tax also increased revenue. The use of tax policy will result in greater reductions in alcohol use among the poor, thereby reducing the health and social inequalities that result from alcohol use.

REFERENCES

The Economist, 21 December 2013. We wish you a merry(ish) Christmas.
Available: http://www.economist.com/news/leaders/21591871-raising-price-booze-saves-lives-and-money-scotland-right-try-it-we-wish-you
[Accessed 30 January 2014]

International Agency for Research on Cancer (IARC), 2011. IARC Handbooks of Cancer Prevention, Tobacco Control, Vol 14: Effectiveness of Tax and Price Policies for Tobacco Control. Lyon, France.