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<b>Title</b>	Do excise taxes save lives? The Irish experience with alcohol taxation
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<b>Publication date</b>	1986-05
<b>Publication information</b>	Walsh, Brendan M. "Do Excise Taxes Save Lives? The Irish Experience with Alcohol Taxation." University College Dublin. School of Economics, May 1986.
<b>Series</b>	UCD Centre for Economic Research Policy Paper Series, No. 20
<b>Publisher</b>	University College Dublin. School of Economics
<b>Item record/more information</b>	<a href="http://hdl.handle.net/10197/1366">http://hdl.handle.net/10197/1366</a>
<b>Notes</b>	The binding of this item renders some marginal text unreadable. A hard copy is available in UCD Library at GEN 330.08 IR/UNI

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**DO EXCISE TAXES SAVE LIVES?  
THE IRISH EXPERIENCE WITH ALCOHOL TAXATION**

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Policy Paper No. 20

May 1986

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## Introduction.

Heavy taxation of substances such as alcohol and tobacco is frequently justified on the grounds that it may reduce the level of social costs associated with their consumption. Firm evidence of the effectiveness of taxation in this regard is difficult to obtain but a recent study of the United States experience concluded that "taxes do reduce [alcohol] consumption and in particular reduce those portions of total consumption associated with auto fatalities and liver cirrhosis" (Cook, 1980, p. 38). This conclusion is based on evidence relating to the effects of changes in excise taxes in individual states of the U.S. While the type of data used in this study is not generally available in other countries, it is possible to explore the effects of excise taxes on road accidents and cirrhosis mortality in any country for which reliable time series data are available on alcohol consumption, prices, taxation and mortality by cause. The present study examines the Irish experience on the basis of such data and illustrates the issues that arise in trying to answer the question posed in the title.

## Conceptual Framework.

Drinking has been linked with numerous public health and social problems. This study is confined to the link between alcohol consumption and road accidents and cirrhosis deaths. Both these causes of death have been linked with alcohol abuse in previous Irish research. A significant correlation over time between cirrhosis mortality and aggregate alcohol consumption in Ireland has been noted (Walsh and Walsh, 1973). Studies of Irish traffic accidents have shown that between one in five and one in two of those killed on the roads have blood alcohol levels in excess of 125mg/100ml (An Foras Forbartha, 1983).

The existence of a link between drinking and these two causes of death is not, of course, sufficient to establish that increases in excise taxes on alcohol would reduce the number of deaths. To establish this it is necessary to show that the follow chain of events occurs:

increased taxation-->higher retail prices-->decreased consumption-->fall in mortality

Each link in this chain offers possibilities for the process to be attenuated. The following is a summary of the ways in which this attenuation might occur. Subsequent parts of this paper examine their importance empirically.

\* Taxation and Prices. Changes in indirect taxes, such as sales taxes, VAT and excise taxes, do not necessarily translate in equivalent changes in retail prices. Part of a tax change may be absorbed by changes in the incomes of those who work in the production and distribution of the taxed goods. This possibility is generally ignored by those who advocate higher taxation as a means of reducing the level of social problems related to alcohol consumption.

\* Prices and Consumption. The effect of price changes on consumption has been widely studied. In many countries there is a degree of consensus as to the values of the relevant price elasticities of demand. However, the following considerations imply that caution has to be exercised in using estimated elasticities to draw inferences about the effects of price changes on actual total alcohol consumption. First, many of the available studies deal with individual beverages (beer, wine, spirits) separately and do not explore the possibilities for beverage substitution in response to selective tax increases.<sup>1</sup> Secondly, there is the problem of the effect of high prices on illicit and unrecorded consumption. The use of data for recorded consumption tends to overstate consumers' responsiveness in situations where price increases stimulate a significant amount of unrecorded consumption.

\* Consumption and Problems. Most econometric studies of alcohol consumption are at an aggregate level and do not reveal how price changes affect the drinking of problem drinkers. No research has been undertaken to explore how price changes affect different types of drinkers in Ireland. In the absence of information on this point, it is impossible to infer that reductions in consumption brought about by an

<sup>1</sup> For a discussion of the technical issues associated with estimating demand functions for alcoholic beverages see Thom (1984).

increase in taxation lead to reductions in the level of alcohol-related problems.

To overcome these limitations, which are present in varying degrees in previous studies, Cook used a "quasi-experimental" procedure to study the impact of excise tax changes directly on auto fatalities and cirrhosis deaths rather than indirectly through their effect on aggregate consumption. On the basis of the evidence of the effects of changes in liquor taxes occurring in 21 U.S. states at various times between 1961 and 1975 he concluded that tax increases reduce auto fatalities and cirrhosis deaths. Although stating that the magnitudes are "highly uncertain", he estimated that a 10 per cent increase in liquor taxes leads on average to a 9 per cent reduction in cirrhosis deaths and a 7 per cent reduction in auto fatalities.

While it is not possible to replicate the estimation procedures used by Cook for countries such as Ireland with a uniform national liquor tax, it is possible to try to establish the effect of taxes on the level of alcohol-related problems using time series data. The following sections of this paper present the results of applying this approach to the Irish experience.

#### Taxation and Alcohol Prices.

Alcoholic beverages are heavily taxed in Ireland. A recent international comparison showed that Irish special taxes on alcohol are significantly exceeded only by those in Norway. The weighted average of the excise taxes on beer, wine and spirits<sup>2</sup> was IR#16.80 in 1982, compared with #3.20 in the United States (O'Hagan, 1983). As a consequence of this high rate of alcohol taxation, the proportion of the retail price of alcoholic beverages accounted for by taxation is very high in Ireland: 54% for beer, 82% for spirits and 49% for wine (compared with 17% and 46% for beer and spirits in the United States).

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<sup>2</sup> Using the share of these beverages in total consumption as weights.

Over the years Ministers for Finance have regarded excise taxation in general, and beer excise taxes in particular, as a buoyant revenue source.<sup>3</sup> Between 1961 and 1969 the real excise tax on beer increased by 85% (see Figure 1). Real excise taxes fell during the highly inflationary 1970s, but nonetheless the real tax on beer was about 40 per cent higher in 1985 than it had been in the early 1950s. The excise taxation of spirits has been more lenient, with no marked trend in the real tax level apparent during the 1950s and 1960s, and a decline of about one-third between 1969 and 1978 (see Figure 2). However, between 1978 and 1982 the real excise taxation of spirits rose sharply. This increase (combined with movements in the Irish pound/sterling exchange rate) resulted in a widening gap between retail spirits prices in Northern Ireland and the Republic of Ireland. The resultant sharp increase in licit and illicit cross-border traffic in spirits (see below) led the Minister for Finance to reduce the excise tax by about 9% in the Budget of 1984.

A rigorous analysis of the incidence of the excise tax on beer and spirits is beyond the scope of the present paper. Such an analysis would require data on retail prices in money terms, which are not available.<sup>4</sup> The final price of a commodity on which an excise tax is levied is the sum of the tax and the net-of-tax price. The rate of increase in the the final price is therefore the average of the rates of increase in the excise tax and the net-of-tax price (weighted by their shares in the final price). In the absence of data on the net of-tax-price, it is not possible to draw firm conclusions about the degree of forward and backward shifting.

Economic theory suggests that the impact of a tax change on retail prices will be greater the more inelastic the demand for the commodity and the more elastic its supply.

Adam Smith in Book V, Chapter II of The Wealth of Nations published in 1776 wrote

<sup>3</sup> Value Added Tax is charged on the excise tax.

<sup>4</sup> The published Consumer Price Index gives a separate index for "alcoholic beverages" but not for individual beverages. The beer and spirits price index numbers shown in Figures 1 and 2 were constructed from data made available by the Central Statistics Office.

...the rent and profit of barley land have never been above their natural proportion to those of other equally fertile and equally well cultivated land, [t]he different taxes which have been imposed upon malt, beer and ale, have never lowered the price of barley; have never reduced the rent and profit of barley land. The price of malt to the brewer has constantly risen in proportion to the taxes imposed upon it; and those taxes, together with the different duties upon beer and ale, have constantly either raised the price, or what comes to the same thing, reduced the quality of those commodities to the consumer. The final payment of those taxes has fallen upon the consumer, and not upon the producer.

On the other hand, because high quality wine was produced on land whose alternative use was much less profitable, a tax on wine would be borne by the owners of vineyards rather than wine drinkers. Products such as wine were therefore "of all subjects [of taxation] the most proper".

Supply and demand conditions have changed dramatically since Adam Smith's time, and the question of the incidence of taxation has to be explored empirically for individual countries. In Ireland previous studies have shown that the demand for beer is price-inelastic, while the demand for spirits is relatively price elastic (see below), and there is a high degree of monopoly in the supply of both beer and spirits. Under these conditions it is to be expected that some of any changes in taxation would be absorbed by the producers and/or distributors rather than passed on to consumers.

Figures 1 and 2 show that beer and spirits prices have fluctuated less widely than have the respective excise taxes. This impression is confirmed by looking at the coefficients of variation (the standard deviation as a percentage of the mean) of these series:

Beer	Beer	Spirits	Spirits
Price	Tax	Price	Tax
Index	Index	Index	Index
12.2%	19.5%	7.4%	12.2%

The regression results displayed in Table 1 suggest that the effects of a one per cent increase in the tax index on the final price declines the higher the level of the tax (as seen in the highly significant, negative coefficient for the squared tax term). Thus, forward shifting of taxes to the consumer seems to be more complete when the excise tax

is low in real terms and more of a tax increase is absorbed by producers and/or distributors when the level of taxation is high. This statistical result reflects the tendency, apparent in Figure 1, for beer prices to level off in the late 1960s despite sharp tax increases, and the fact that, as may be seen in Figure 2, as spirits taxes increased from the relatively low level reached in the late 1970s, spirits prices increased pari passu. Thus there is some evidence that during periods when excise taxes are increasing rapidly in real terms there is a significant degree of backward shifting of these taxes, which reduces the impact on retail prices.

#### Consumption and Prices.

The recorded consumption of beer, spirits and wine over the period 1951-84 is shown in Figure 3. Consumption increased rapidly from the end of the 1950s until 1974. Although there was a recovery between 1976 and 1979, when the highest level of recorded consumption was reached, slower economic growth and higher real alcohol prices reduced recorded consumption by over one quarter between 1979 and 1983.

It is necessary to emphasize that these figures relate to recorded consumption because the sharp rise in Irish prices, especially spirits prices, during the 1980s is widely believed to have caused a major increase in smuggling over the land border between Northern Ireland and the Republic.<sup>5</sup> The rise in Irish exports to Northern Ireland may therefore be taken as an indication of the volume of the re-importation that occurred. The manner in which these exports soared in the early 1980s as the price differential between the two areas widened is shown in Figure 4. Comparing 1983 with earlier years, the size of the abnormal cross-border flows would seem to be between 2.6 and 4.2 million KL of spirits or between 1 and 1.7 Million litres of pure alcohol. This compares with a total recorded consumption of spirits of 4.9 million litres of alcohol and a total consumption of alcohol of 20.2 million litres in 1983. Thus it is possible

<sup>5</sup> Ironically, much of the liquor brought back to the Republic in this manner had been exported to Northern Ireland by the dominant distilling company in the Republic, which also sells in the Northern Ireland market.



that recorded alcohol consumption understates actual consumption by between 5 and 8 per cent in 1983.<sup>6</sup>

Estimates of price elasticities of demand for alcoholic beverages in Ireland have been provided in Walsh (1980) using quarterly data for the period 1965-77. The evidence suggests that the price elasticity of demand for beer is very low, at most equal to 0.3.<sup>7</sup> The elasticity of demand for spirits was found to be 0.6. Estimates were not obtained for wine. The price elasticity of demand of alcoholic beverages as a group was put in the range 0.6 to 0.8 by McCarthy (1977), based on annual data for the period 1953-77. On the basis of these studies it would therefore seem that a 10 per cent increase in the real price of alcoholic beverages would result in at most a decline of 6 per cent in the volume consumption of alcohol. To achieve such an increase in the final prices would require excise tax increases of the order of 20 per cent for beer and 12.5 per cent for spirits even if full forward shifting of the tax increases is assumed.

#### Consumption and Problems.

Liver Cirrhosis Deaths. No studies have been undertaken of the manner in which the reduction in aggregate alcohol consumption that follows a price increase is distributed between different types of drinkers in Ireland. It is known that much of the rapid growth in consumption during the 1960s and 1970s was due to the fall in the proportion of non-drinkers as increasing numbers women and youths were recruited to the drinking population. These changes probably reflected changes in the distribution of disposable income, reinforced by advertising and new products targeted on these population groups.

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<sup>6</sup> These calculations make no allowance for smuggling of beer and wine, which undoubtedly occurs, although on a smaller scale than spirits. The estimate for spirits is based only on the abnormal cross-border exports of Irish-produced spirits. Significant quantities of non-Irish spirits may also be smuggled into the Republic.

<sup>7</sup> All elasticities are given in absolute value. An elasticity of 0.3 implies that a 10 per cent increase in the real price of alcohol would cause a 3 per cent fall in the quantity consumed, all other factors remaining equal.

In the absence of studies of how price changes affect individual types of drinkers it is important to look directly on the link, if any, between aggregate consumption and problems such as cirrhosis deaths and road accidents. Exploring this topic on the basis of time series statistics is, however, fraught with statistical problems and care must be exercised not to read too much into the results.

A statistical link between aggregate alcohol consumption and the number of deaths from liver cirrhosis has been established in several previous studies of a number of countries (Brenner, 1983; Cook, 1980). In Ireland it has been noted that the death rate from liver cirrhosis rose sharply during the decades before the First World War and declined sharply during and after the War, in line with the behaviour of other indices of heavy drinking such as the prosecution for drunkenness rate (Blaney, 1973/74). A significant positive correlation between alcohol consumption and the cirrhosis death rate has been established for the period 1948-70 (Walsh and Walsh, 1973). Figure 5 displays the death rate for cirrhosis for the years 1951-84. In Table 2 this rate is regressed on aggregate alcohol consumption and trend. It is clear from the results obtained that there is a highly significant association between the cirrhosis death rate and the recorded level of per capita alcohol consumption. This is hardly surprising in the light of previous findings for other countries. It is striking, however, that the regression results show that lagged alcohol consumption is not significantly associated with the cirrhosis mortality rate. Fluctuations in consumption appear to have a contemporaneous effect on the death rate, despite the fact that cirrhosis deaths ensue from the cumulative effects of prolonged and heavy drinking. The negative coefficient of ALKOLAG in Table 2 raises the possibility that the effect of an increase in aggregate alcohol consumption on the death rate is partly due to the bringing forward of deaths that would otherwise occur at a later date. However, the coefficient of ALKO in the third equation is 0.76 and that of ALKOLAG is -0.37: if alcohol consumption levelled off, so that  $ALKO=ALKOLAG$ , the two coefficients could be summed to obtain an estimate of the

longer-run effect of consumption on the death rate. The sum of the coefficients is 0.40, exactly the same as that of the coefficient of ALKO in the first equation in the Table, from which ALKOLAG is excluded.

The regression results can be used to give estimates of the responsiveness of cirrhosis mortality to changes in the aggregate level of drinking. The estimate of the elasticity of the cirrhosis death rate with respect to ALKO obtained from the first equation in Table 2 is 0.7. Combining this with the estimate of the price elasticity of demand for alcohol discussed above yields an estimated decrease of 4 per cent in cirrhosis deaths for a 10 per cent increase in alcohol prices. As was noted above, proportionately larger increases in excise taxes on beer and spirits would be required to generate these increases in retail prices.

These equations can also be used to estimate the level of cirrhosis mortality not associated with alcohol consumption. If ALKO is set equal to zero, the predicted value of the death rate is 1.26 (equation 3). This compares with an actual value of 5.7 in 1980 (the highest rate recorded since before the First World War) or a low of 2.2 in 1953. These calculations would suggest that in recent years up to 80 per cent of cirrhosis deaths were alcohol-related, compared with 40 per cent in the early 1950s.

In assessing the importance of the finding that there is an association between alcohol consumption and cirrhosis deaths it has to be recalled that, as emphasised above, this is a relatively uncommon cause of death in Ireland. A large autopsy study suggested that cirrhosis deaths are understated by a factor of 3.6 (Duffy and Dean, 1971). If this factor has remained constant over time, it may be used to "gross up" the official data on cirrhosis deaths and obtain a more realistic estimate. It is, however, very difficult to make any informed allowance for the proportion of deaths from other causes that is due to excessive drinking or to assess how these respond to variations in aggregate consumption.

Road Accidents. The number of people killed on the roads in Ireland per 1,000 registered vehicles is shown in Figure 6.<sup>8</sup> The marked downward trend in the fatality rate is striking, but it is also clear that there has been cyclical variation around that trend. A vertical reference line is drawn at 1977 marking the end of the period before the adoption of two potentially significant measures, namely, the re-introduction of the Breathalyser test in August 1978 and the passage of a law making the wearing of front safety belts compulsory in February 1979. One of the questions to be explored in any investigation of the determinants of the accident rate is whether the introduction of these measures had a significant and lasting effect.

Since 1968 more detailed statistics on Irish road accidents have been compiled. More details are provided on accidents in which people are injured and the time of day when accidents occur is published. Figure 7 displays the fatality rate at all hours and between 2100-0300 hours for the period 1968-84. Figure 8 displays the injury-accident rate.

These data were analysed to explore the relationship between total alcohol consumption and road fatalities and injuries. Table 3 displays regression results with the fatality rate as dependent variable.<sup>9</sup> A highly significant non-linear negative trend is apparent in the data. This indicates a rate of decrease in the fatality rate that is slowing down with the passage of time. This no doubt reflects the benefits of improvements in car and road design and similar factors, and "diminishing returns" to these as the largest gains are reaped relatively quickly and further gains become increasingly more difficult to obtain. Total alcohol consumption has a significant, positive coefficient.

<sup>8</sup> The rate per 1,000 vehicles has been used because estimates of the number of miles driven are not available for recent years. Thus no allowance is made for the cyclical variation in the number of miles driven per vehicle or for the effect of the 1979 fuel shortage.

<sup>9</sup> Regressions with the injury rate as dependent variable did not yield meaningful results. The coefficient of ALKO was generally not significant. The sharp decline in the injury rate between 1968 and 1975 contrasts with the increase in the fatality rate over the period 1968-72. The data for injuries are probably less reliable, and more influenced by classification considerations, than are the fatality data.

cient in all these equations, indicating that the road fatality rate tends to increase with rising aggregate consumption of alcohol. The estimated elasticity is close to 0.6 in these equations. Combined with the estimate of the price elasticity of demand for alcohol consumption, this suggests that a 10 per cent price increase would cause somewhat less than a 4 per cent reduction in road fatalities.

The timing of legislative changes in the late 1970s poses considerable difficulties for the evaluation of the effects of these changes. Safety belt legislation was introduced six months after the passage of stricter breathalyser regulations. Three months later there was a severe shortage of motor fuels. It is difficult to separate the influences of these changes using aggregate time series data. Two dummy variables have been used to try to capture the effects of breathalyser and safety belt legislation on the fatality rate. The first,  $D78^1$ , assumes a value of 1 in 1978 and zero otherwise. This is designed to capture any transitory effect of the breathalyser regulations introduced in mid-1978. The second,  $D79$ , takes the value 1 in 1979 and subsequent years, and zero in years before 1978. The  $D79$  variable is intended to capture any lasting effects of the breathalyser test as well as of the safety belt law. It is likely that the second measure has had the more important effect. The breathalyser law has been repeatedly challenged in the courts and the commitment to enforcing it has fluctuated widely. An evaluation of the impact of the test conducted in 1979 noted the tendency for the reduction in accidents attributable to it to wear off within six months (An Foras Forbartha, 1979). On the other hand, compliance with the law requiring safety belts to worn was low initially but seems to be rising.

The regression results with the fatality rate as dependent variable show negative coefficients for  $D79$  and for  $D78^1$ , although their statistical significance is low. The coefficient of  $D78^1$  indicates a reduction of 0.07 or 9 per cent in the fatality rate in the year the breathalyser was introduced. This is quite large in view of the fact that the new regulations went into force only in August. The coefficient of  $D79$  indicates a

reduction of 0.15 per 1,000 or just under 20 per cent in the fatality rate after 1978, which could be attributed to the continued impact of the breathalyser test or to the growth in safety belt usage or to some combination of both. For the reasons given above, it is likely that the effect of increased safety belt usage predominates.

Table 3 also shows the results obtained when the proportion of all fatalities occurring between 2100-0300 hours is the dependent variable.<sup>10</sup> It may be seen that total alcohol consumption is positively associated with this proportion. It is also interesting to note the positive coefficient of D79 in the equations with this dependent variable. A higher proportion of fatalities occurring during the hours 2100-0300 after 1978/9 is consistent with the interpretation that the reduction in accidents attributable to the safety belt legislation occurred disproportionately among accidents occurring between 0300 and 2100 hours. The coefficient of D78<sup>1</sup> is positive and significant at the 10 per cent level. This result is surprising, as enforcement of the drunk driving laws would be expected to have the biggest impact on accidents occurring between 2300-0300 hours.

#### Caveats.

The statistical results reported in this paper are broadly in line with those reported by Cook for the United States on the basis of very different data. Several limitations of the study should, however, be emphasised.

With time series data of the type used in the present study there is always the possibility that the influence attributed to alcohol consumption is really due to some other factor with which alcohol consumption is highly correlated over time. The time path of total alcohol consumption displayed in Figure 3 is broadly similar to that found in all the main Irish economic series since 1950. If, for example, real total personal consumption expenditure is substituted for ALKO in the equations shown in Tables 2 and 3 the

<sup>10</sup> Regressions were also run with the 2100-0300 hours fatality rate as dependent variable. Strangely the results obtained did not indicate as important a role for ALKO or for D78<sup>1</sup> as was the case with the total fatality rate as dependent variable.

statistical results (in terms of t-ratios and  $R^2$ ) are only marginally worse than those obtained using ALKO. Similarly, the rate of unemployment would provide almost as a good a fit to the data as ALKO. This of course reflects the fact that alcohol consumption has declined only in periods of declining living standards when the consumption of almost all goods and services has declined. The influence attributed to alcohol on the basis of the results reported above may therefore reflect the influence of other items whose consumption is highly correlated over time with that of alcoholic beverages.

In the foregoing analysis, the link established between aggregate consumption and alcohol related deaths has been assumed to hold regardless of the source of the variation in alcohol consumption. Econometric analysis of aggregate alcohol consumption shows that income, rather than price, is the main source of variation over time in consumption. The decline in drinking that occurred in Ireland in the mid-1970s and again in the early 1980s was due to recession and high unemployment rather than to tax-induced price increases. To the extent that the two factors affect different types of drinkers differently, a point on which we have no evidence, it would be mistaken to assume that the effect on alcohol-related problems would be the same regardless of whether the reduction in consumption was due to increased prices or declining incomes. Moreover, the effect of further tax increases on true, as opposed to recorded, consumption cannot be extrapolated from evidence obtained during periods when Irish and British retail prices were very similar. The emergence of major cross-border flows of items that are heavily taxed has significantly reduced the scope for an independent tax policy in Ireland.

On the other hand, the focus of this study has been on a narrow concept of alcohol-related deaths. In addition to the problem of the possible underreporting of alcoholic liver disease, alcohol consumption probably contributes to a wide range of other causes of death and tax-induced price increases would lead to a reduction in these.

### Assessment.

The analysis in this paper supports the view that higher excise taxes on alcohol lead to price increases that reduce aggregate consumption in a manner that reduces the level of alcohol-related problems, specifically deaths from liver cirrhosis and fatal road accidents. The magnitude of the effects can only be estimated very tentatively, but if the assumed price elasticity of demand for alcoholic beverages is at the higher end of the plausible range (0.6), a simultaneous increase of 12.5 per cent in the real spirits excise tax and 20 per cent in the real beer excise tax would be required to reduce the liver cirrhosis death rate by 6 per cent and the road fatality rate by 4 per cent. These very substantial real tax increases would avert about 22 deaths a year from a total of 33,000 deaths from all causes. Even if the the number of liver disease deaths averted is increased by a factor of 4, to allow for possible underreporting, the total number of averted deaths only increases increases to 40.

In assessing the social benefit from these averted deaths, account should be taken of the suicidal element in some alcohol-related deaths. A death resulting from prolonged heavy drinking, leading to fatal liver damage and eventual death and the death of a drunken driver due his own recklessness are clearly of less social significance than the deaths of innocent parties caused by those under the influence of alcohol. Ideally, a social cost-benefit appraisal of a policy would treat these categories of averted deaths separately, but it is not possible to disaggregate the deaths that might be averted by higher taxes into these categories. The deaths of non-drinking victims of road accidents are clearly non-suicidal. But over half those killed on the roads are found to have elevated blood alcohol levels. Their deaths, and the deaths of those who die from alcoholic liver disease, to some extent reflect voluntary decisions made by those who suffer the consequences.<sup>11</sup>

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<sup>11</sup> Evaluating the social costs of the loss of income etc. following such deaths raises unresolved methodological issues that lie outside the scope of this paper.





It is likely that reduced consumption of alcohol would also result in a reduction in the number of deaths from other causes, such as other types of accidents, other violent deaths, and deaths caused by illnesses other than cirrhosis in which heavy drinking is a contributory factor. However, the additional deaths averted under these headings are not likely to be very numerous, having regard to the small numbers that it is estimated would be averted in the categories most closely associated with alcohol abuse. On the other hand, deaths from cirrhosis, road fatalities and similar problems are the extremes on a continuum of alcohol-related problems. It is likely that moderating alcohol consumption would not only avert some alcohol-related deaths but also reduce the incidence of a wide range of less severe consequences of alcohol abuse.

Heavier taxation of alcoholic beverages would affect the pattern of expenditure and the distribution of income. These effects are not easily estimated. Cross-section estimates, based on household expenditure surveys, suggest that expenditure on alcoholic beverages is relatively income elastic. Spirits and wine in particular have high income elasticities of expenditure and the proportion of income spent on these items increases as household income increases (provided the influence of household composition is allowed for, see Pratschke, 1969). In this sense, then, alcohol excise taxes may be "progressive". On the other hand, the proportion of Irish national disposable income that is spent on alcohol is already very high by international standards and heavier taxation would tend to raise it. The behaviour of real beer taxes and the proportion of total consumer spending devoted to alcohol are shown in Figure 9. The tendency for heavier beer taxation to raise expenditure is confirmed by the regression results in Table 4. Higher spirits taxes, on the other hand, tend to reduce this proportion. These results simply reflect the price inelastic demand for beer and price elastic demand for spirits.

While the high proportion of income devoted to the purchase of alcoholic beverages is often deplored in Ireland, its true social costs and benefits are far from clear. Above all, it is important to bear in mind that almost 40 per cent of the amount spent

on alcoholic beverages accrues to the exchequer as excise tax revenue.<sup>12</sup> Commodities that are price inelastic are attractive from a revenue point of view: despite the high level of excise taxes on beer and spirits in Ireland, the available range of elasticity estimates imply that further increases in these taxes would, other things equal, increase their revenue yield (see Thom, 1984). It may also be argued that taxes levied on items such as beer, the demand for which is inelastic, result in a relatively small "deadweight" loss because there is relatively little distortion of demand due to tax-induced price changes. On the other hand, the increase in the proportion of income spent on these commodities leaves less purchasing power available for all other items in the household budget. This may cause severe problems within households, if drinking by a head of household deprives the rest of the household of money for essentials.

An evaluation of the costs and benefits of alcohol taxation should ideally be related to similar evaluations of alternative ways of achieving reductions in alcohol-related problems. Unfortunately no studies of the costs and benefits of stricter enforcement of the laws on drunken driving or on the availability of alcohol are available. Even if it is accepted that higher taxes are effective in reducing the level of alcohol-related problems, it remains to be shown that they are the best method of achieving this goal. From the point of view of the public finances, however, higher taxation has the clear advantage of generating additional revenue, whereas alternative ways of reducing the number of alcohol-related deaths involve additional public expenditure.

The balance of costs and benefits from increased alcohol taxes differs between countries. The case that has been made for higher alcohol taxes in the United States should be viewed against the background of low, and declining, real excise taxes on beer and spirits in most American states. In countries such as Ireland where the burden of taxation on alcohol is already very high both historically and by international stan-

In 1983 an estimated \$1,044 million was spent on alcoholic beverages and \$370 million accrued to the state through excise taxes on beer, wine and spirits. If VAT revenue is taken into account, almost exactly half of total expenditure on alcohol accrues to the state.

dards, it is more difficult to show that the benefits from heavier taxation would outweigh the costs. Nonetheless, the evidence contained in this paper that a reduction in alcohol-related deaths, including some of totally innocent people, could be achieved by increasing the level of alcohol taxes, should not be ignored in discussions of alcohol policy in Ireland.

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Table 1: Excise Taxation and Beer and Spirits Prices.

Real Beer Price (PB) and Real Spirits Price (PSP) regressed on Index of Real Beer Excise Taxes (BEERTAXI), Real Spirits Excise Taxes (SPIRITAXI) and Trend (YEAR). Annual data, 1953-81.

CONSTANT	BEERTAXI	(BEERTAXI) <sup>2</sup>	YEAR	$\bar{R}^2$	D.W.	RHO
Dependent variable=PB Mean=115.92						
18.69 (3.64)	0.43 (8.57)		0.71 (3.64)	0.96	1.56	0.73
-7.43 (1.86)	1.54 (21.08)	-0.0039 (8.90)		0.99	1.58	0.85
39.2 (2.3)	1.58 (20.97)	-0.0042 (9.25)	0.45 (1.89)	0.99	1.70	0.81
CONSTANT	SPIRITAXI	(SPIRITAXI) <sup>2</sup>	YEAR	$\bar{R}^2$	D.W.	RHO
Dependent variable=PSP Mean=100.07						
61.05 (2.66)	0.37 (3.59)		0.10 (0.36)	0.87	2.07	0.87
1.71 (0.48)	2.04 (18.34)	-0.0103 (8.67)		0.99	2.10	0.86
2.97 (0.16)	2.04 (17.86)	-0.0104 (8.27)	-0.017 (0.07)	0.99	2.10	0.86

otes:

t-ratios in parentheses.

D.W.=Durbin-Watson statistic.

RHO=first order autoregressive parameter (Cochrane-Orcutt procedure)

Table 2: Cirrhosis Death Rate and Alcohol Consumption.

Cirrhosis death rate (DRC) regressed on alcohol consumption per person aged over 14 (ALKO), lagged alcohol consumption (ALKOLAG) and trend (YEAR). Annual observations 1951-84.

Dependent variable=DRC mean=4.05

Constant	ALKO	ALKOLAG	YEAR	$\bar{R}^2$	D.W.
1.20 (3.36)	0.40 (8.36)			0.68	2.01
1.58 (1.66)	0.45 (3.64)		-0.01 (0.43)	0.66	2.03
1.26 (3.48)	0.76 (2.88)	-0.37 (1.40)		0.67	2.30
1.61 (1.47)	0.77 (2.85)	-0.33 (1.18)	-0.01 (0.34)	0.66	2.30

Notes: t-ratios in parentheses.

D.W.=Durbin-Watson statistic.

Table 3: Road Fatalities and Alcohol Consumption.

Road fatality rate (FR, FR21) regressed on alcohol consumption per person aged over 14 (ALKO), a dummy variable for seat belt and breathalyser legislation (D79 and D78<sup>1</sup>) and trend (YEAR).

CONSTANT	ALKO	YEAR	(YEAR) <sup>2</sup>	D79	D78 <sup>1</sup>	$\bar{R}^2$	D.W.	RHO
Dependent variable=FR mean=0.96 Annual observations 1950-84.								
6.20 (5.00)	0.079 (3.35)	-0.14 (3.60)	0.0008 (2.58)	-0.15 (1.44)	-0.073 (0.87)	0.93	2.08	0.43
5.76 (4.91)	0.080 (3.29)	-0.126 (3.44)	0.0007 (2.37)	-0.091 (1.11)		0.93	2.14	0.46
5.06 (4.82)	0.085 (3.45)	-0.10 (3.22)	0.0005 (2.03)			0.93	2.11	0.50
Dependent variable=(FR21/FR) mean=0.40 Annual observations 1968-1984								
0.31 (10.0)	0.0010 (3.03)					0.31	1.92	-0.45
0.31 (10.7)	0.0091 (2.74)			0.0099 (1.36)		0.34	2.01	-0.50
0.31 (10.4)	0.0089 (2.59)				0.023 (1.12)	0.39	2.01	-0.57
0.34 (2.13)	0.0068 (2.13)			0.012 (1.94)	0.033 (1.82)	0.41	2.34	-0.68

Notes:

FR21 = fatality rate, deaths occurring between 2100 and 0300 hours.

D78 = zero up to 1978, 1 thereafter.

D78<sup>1</sup> = 1 in 1978, 0 in all other years.

t-ratios in parentheses.

D.W.=Durbin-Watson statistic.

RHO=first order autoregressive parameter (Cochrane-Orcutt procedure)



Table 4: Expenditure on Alcohol.

Expenditure on alcoholic beverages as a percentage of total personal consumption expenditure (ALKOEXP) regressed on the real excise tax on beer (BEERTAX), the real excise tax on spirits (SPIRITSTAX) and real personal consumer expenditure (PCE). Annual data 1953-83.

Dependent variable=ALKOEXP Mean=10.15.

CONSTANT	BEERTAX	SPIRITSTAX	PCE	$\bar{R}^2$	D.W.	RHO
7.99 (6.68)	0.11 (2.47)			0.93	1.70	0.94
8.89 (1.40)	0.16 (2.90)	-0.15 (1.19)		0.93	1.71	0.90
6.70 (3.09)	0.19 (3.48)	-0.20 (1.43)	0.0023 (1.77)	0.92	1.62	0.60

Notes:  
t-ratios in parentheses.  
D.W.=Durbin-Watson statistic.  
RHO=first order autoregressive parameter (Cochrane-Orcutt procedure)

# DATA APPENDIX

## Principle Variables Used in Analysis

<u>Year</u>	<u>FR</u>	<u>FR21</u>	<u>DRC</u>	<u>ALKO</u>
1950	1.54	-		4.94
1951	1.61	-	2.8	5.20
1952	1.32	-	3.3	4.68
1953	1.40	-	2.2	4.67
1954	1.31	-	2.4	4.76
1955	1.24	-	3.3	4.90
1956	1.29	-	3.4	4.96
1957	1.08	-	3.0	4.82
1958	1.02	-	3.5	4.76
1959	1.10	-	3.1	4.95
1960	1.00	-	2.9	5.08
1961	1.02	-	3.4	5.60
1962	0.95	-	4.1	5.54
1963	0.88	-	3.4	5.75
1964	0.82	-	4.0	6.03
1965	0.80	-	4.5	6.16
1966	0.83	-	2.9	6.13
1967	0.87	-	3.8	6.24
1968	0.89	0.34	4.5	6.62
1969	0.90	0.35	5.2	7.17
1970	0.97	0.34	4.9	7.52
1971	1.00	0.41	3.6	7.98
1972	1.07	0.42	5.3	8.48
1973	0.92	0.36	5.0	9.31
1974	0.90	0.36	5.5	9.92
1975	0.86	0.33	4.4	9.59
1976	0.72	0.28	5.6	9.37
1977	0.78	0.34	4.9	9.52
1978	0.77	0.31	5.5	10.10
1979	0.72	0.32	4.9	10.40
1980	0.62	0.25	5.7	9.95
1981	0.60	0.25	4.6	9.50
1982	0.60	0.22	4.0	9.10
1983	0.60	0.26	4.3	8.24
1984	0.51	0.20	3.8	8.39

FR = Road Accident deaths per 1,000 registered vehicles

FR21 = Road accident death occurring between 2100 - 0300 hours per 1,000 registered vehicles

DRC = Death rate from liver cirrhosis per 100,000 population aged 15 and over

TOTAL = Total recorded consumption of alcohol in litres of ethanol per person aged 15 and over

Sources: FR, FR21 Road Accident Statistics, An Foras Forbartha Dublin

DRC, Annual Reports on Vital Statistics, Department of Health, Dublin

ALKO, Annual Report of Revenue Commissioners, Dublin

Figure 1  
 EXCISE TAX ON BEER AND RETAIL BEER PRICE  
 (Indexes in 1953 prices)

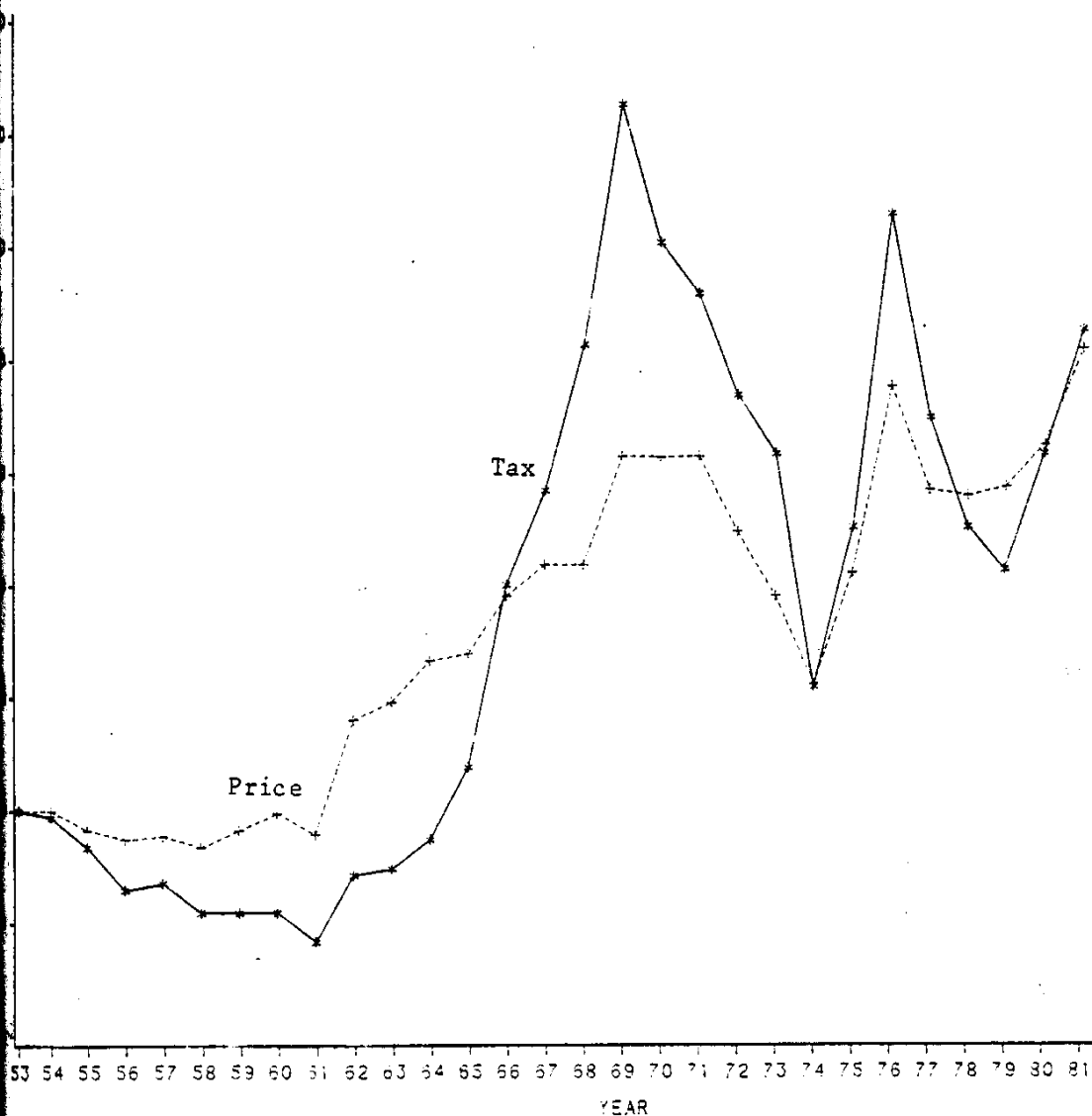


Figure 2

EXCISE TAX ON SPIRITS AND RETAIL SPIRITS PRICE  
(Indexes in 1953 prices)

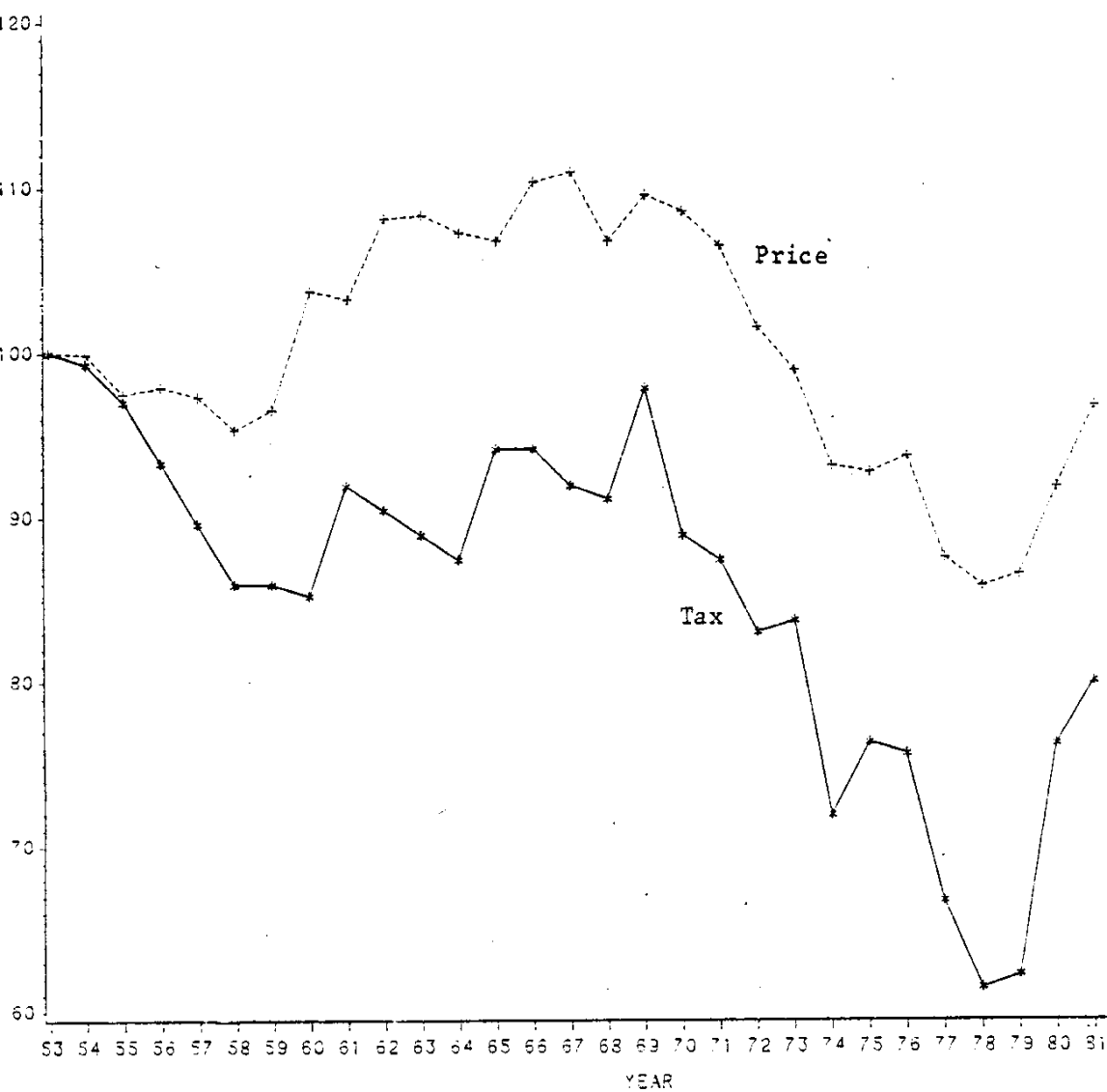


Figure 3

RECORDED CONSUMPTION OF BEER, SPIRITS, WINE AND TOTAL ALCOHOL

(LITRES OF ALCOHOL PER PERSON AGED OVER 14)

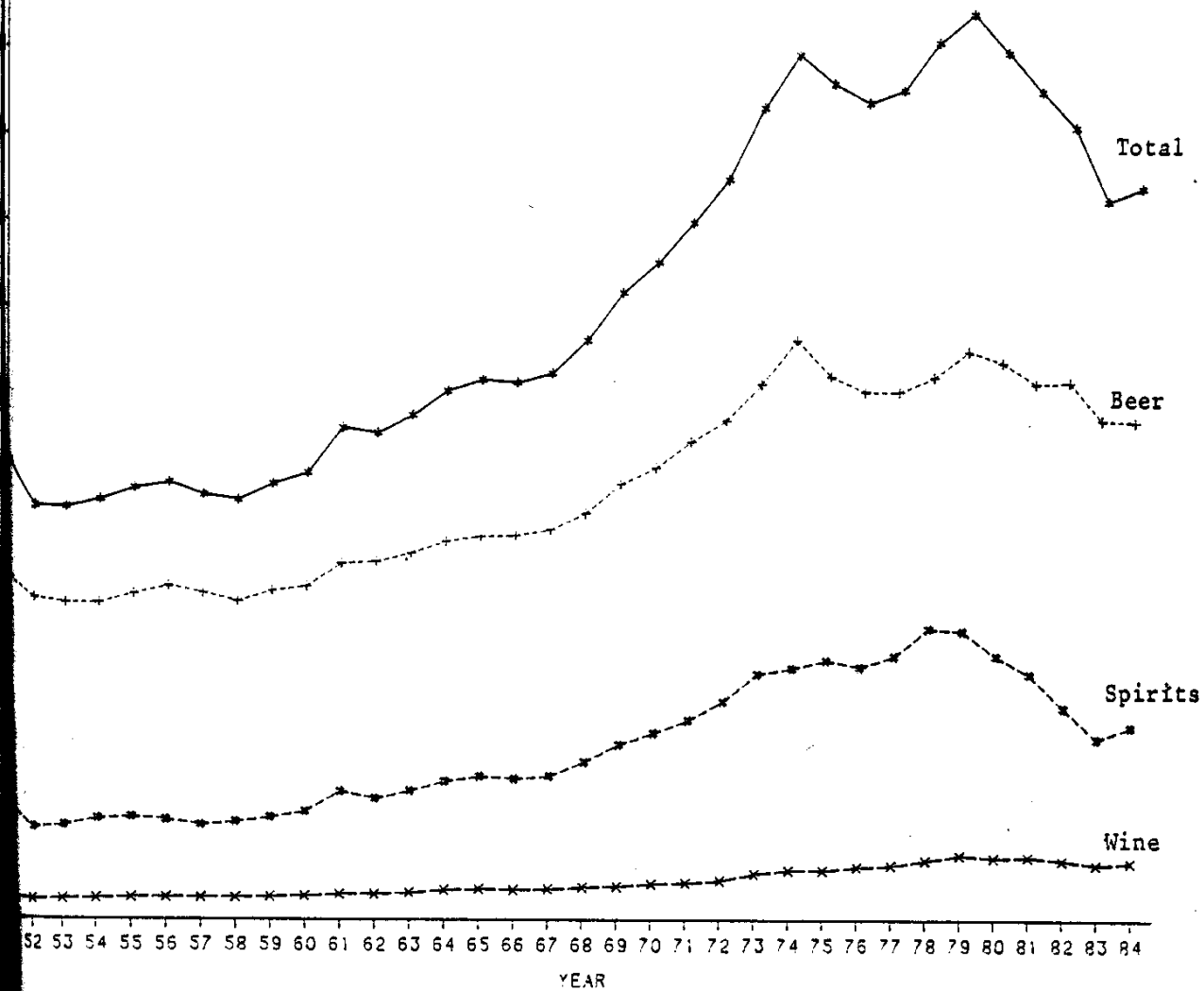
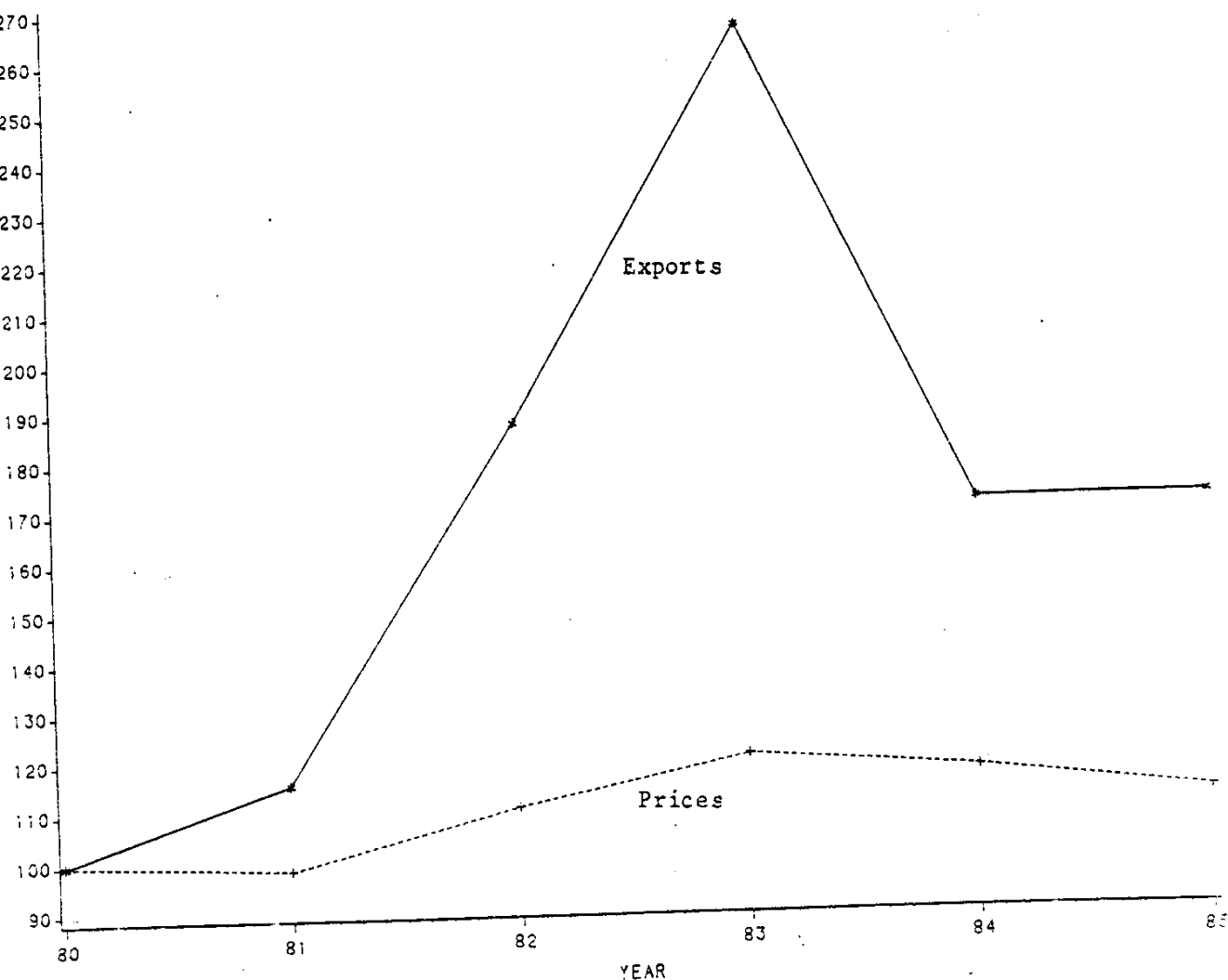


Figure 4

SPIRITS EXPORTS TO NORTHERN IRELAND AND RELATIVE ALCOHOL PRICES



EXPORTS=KL OF SPIRITS  
RELATIVE PRICES=RATIO OF IRISH TO U.K. PRICE INDEX  
BOTH SERIES CONVERTED TO INDEX WITH 1980=100

Figure 5

**CIRRHOSIS DEATH RATE**  
(per 100,000 population aged 15 and over)

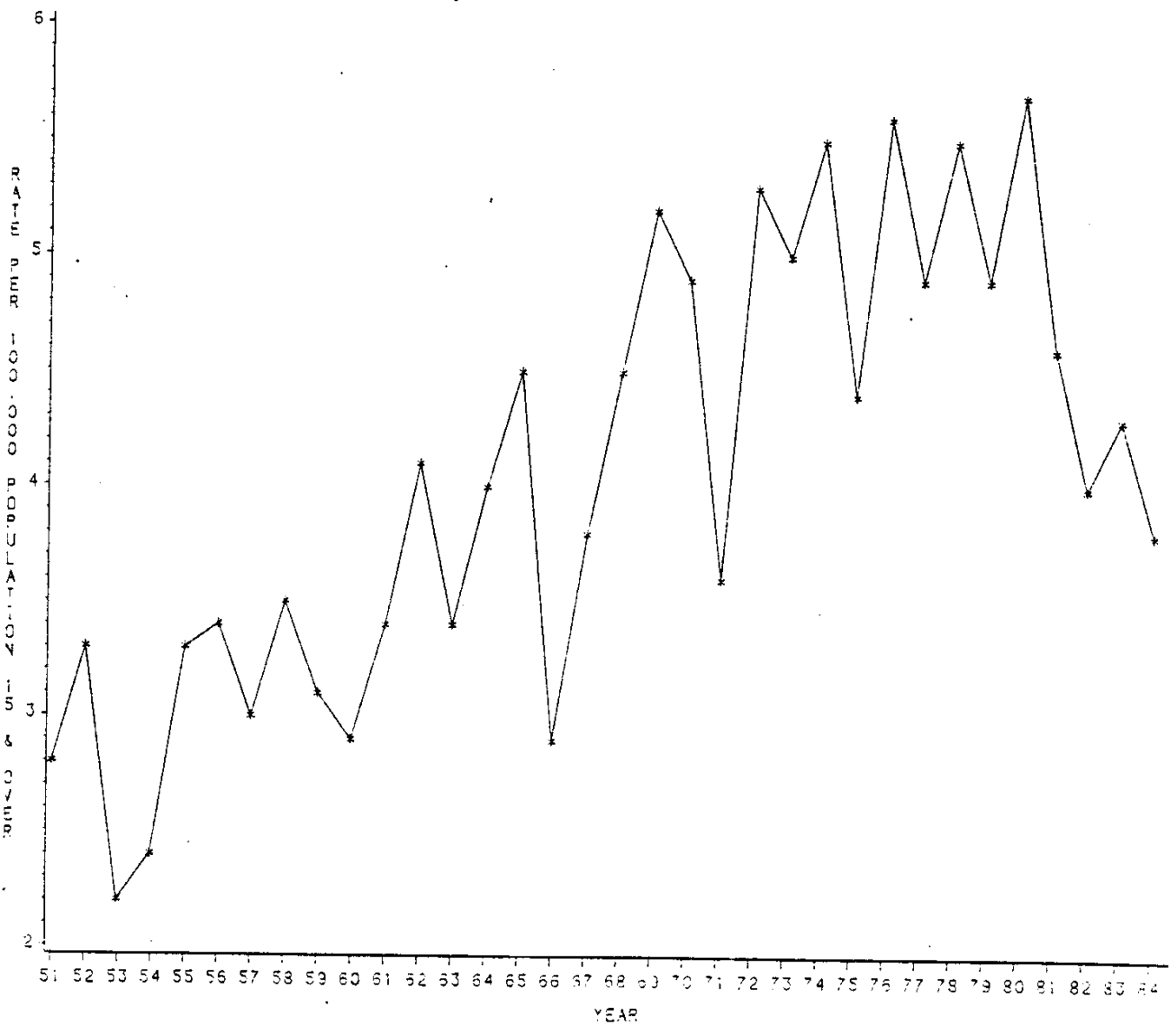


Figure 6

ROAD FATALITIES  
(Deaths per 1,000 registered vehicles)

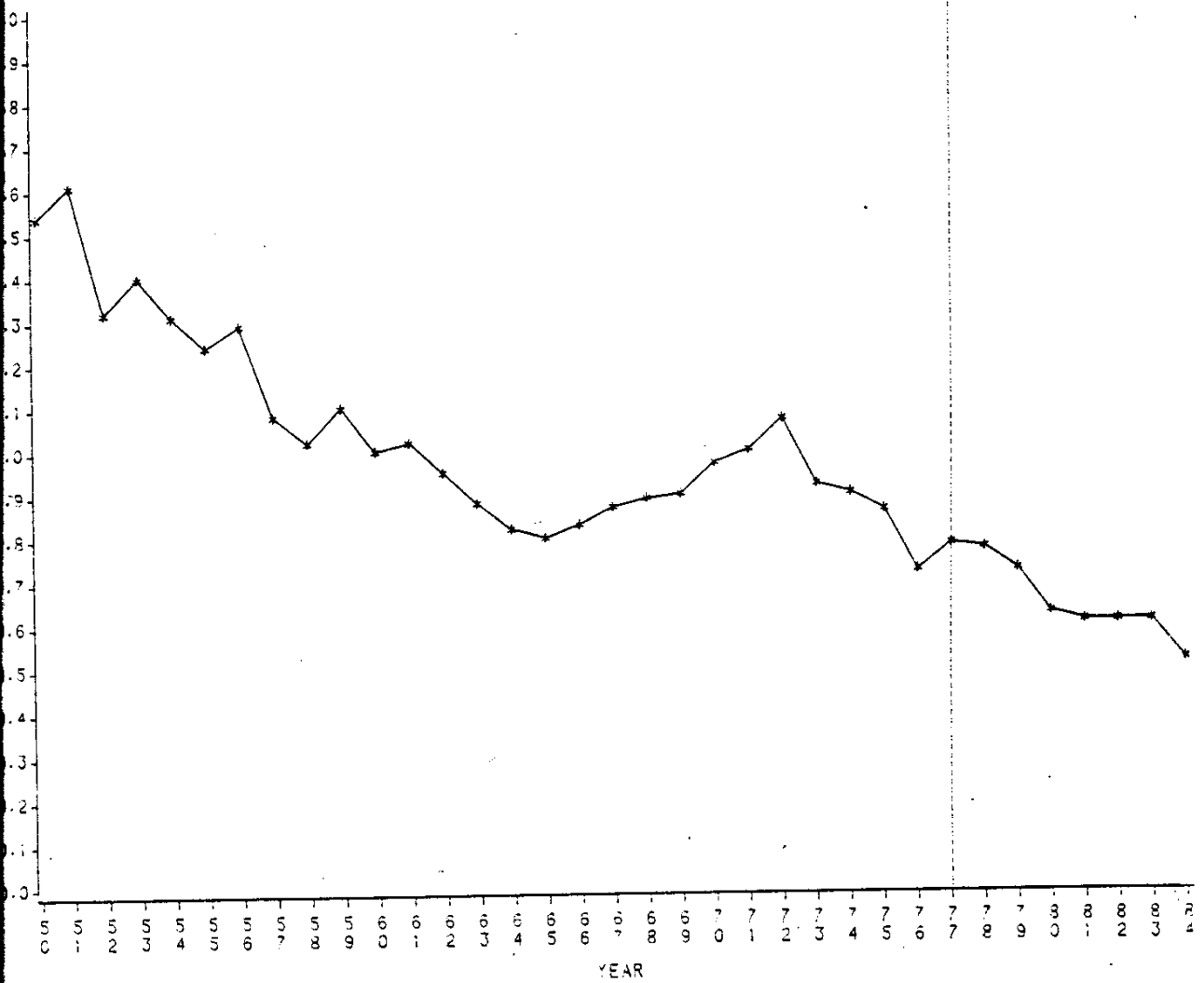




Figure 7

ROAD FATALITIES

(DEATHS PER 1,000 REGISTERED VEHICLES)

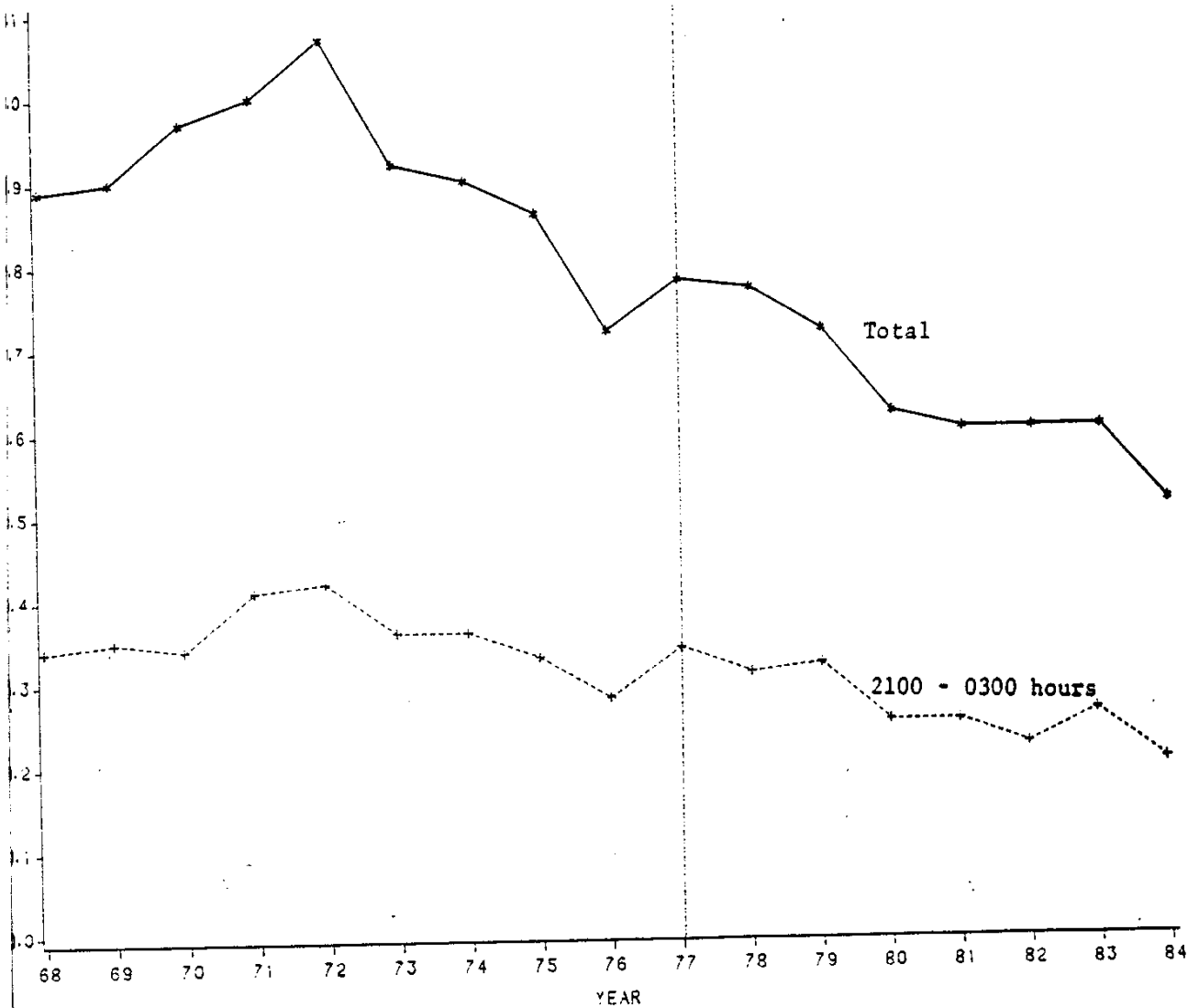


Figure 8

**ROAD ACCIDENTS**  
(injuries per 1,000 registered vehicles)

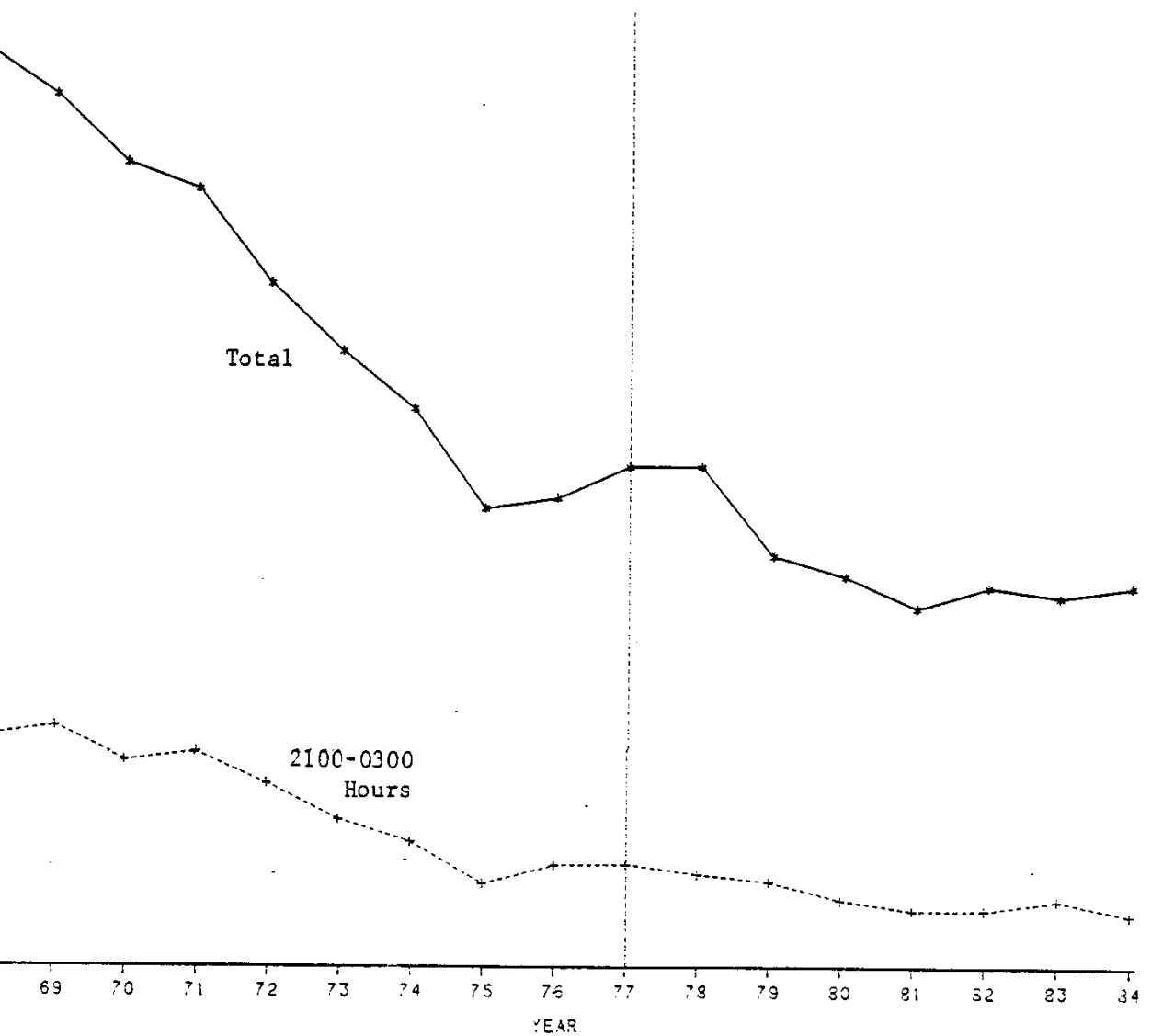
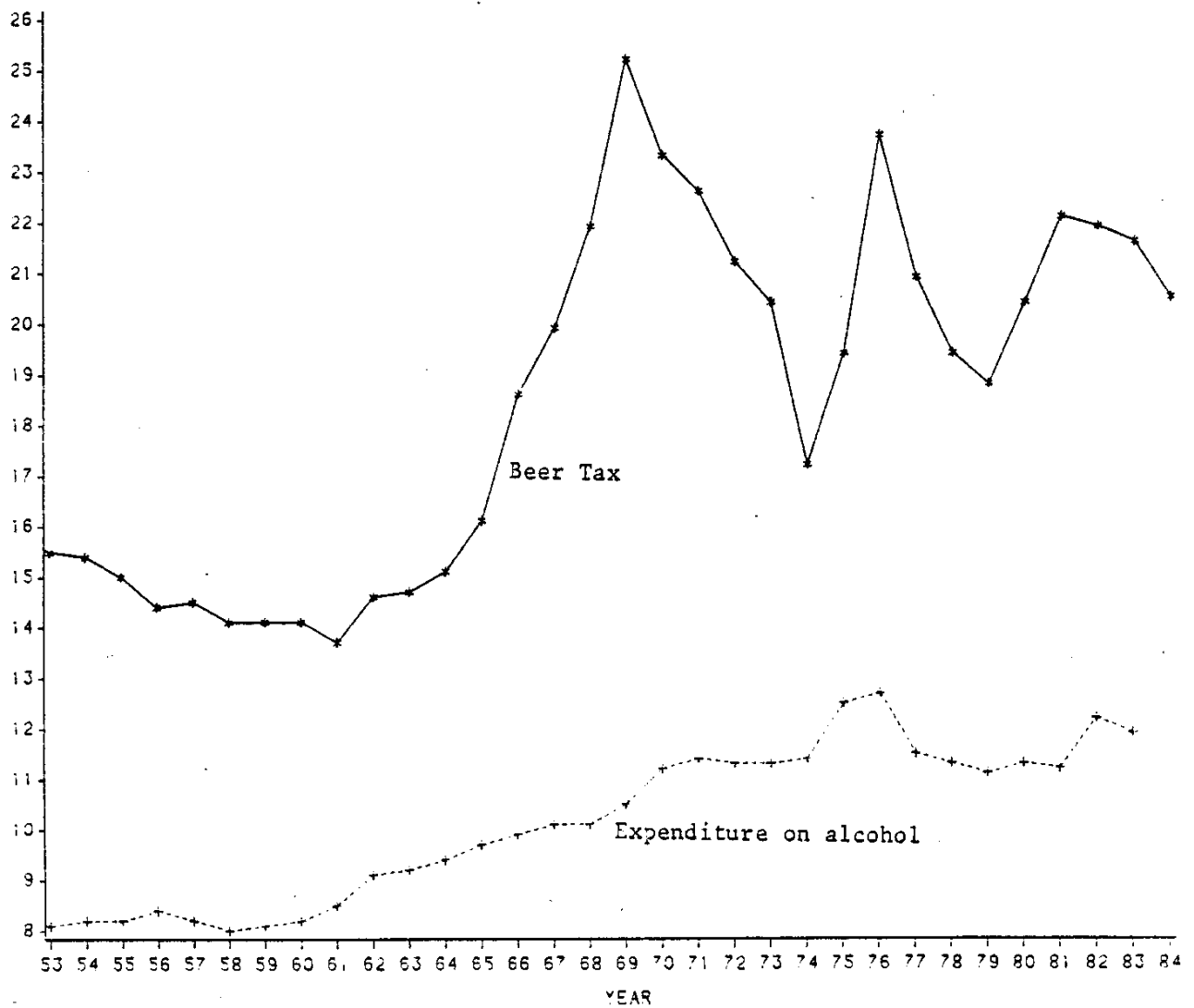


Figure 9

## BEER EXCISE TAXES AND EXPENDITURE ON ALCOHOL



BEER TAXES IN 1953 PRICES  
EXPENDITURE ON ALCOHOL AS % OF TOTAL PERSONAL EXPENDITURE