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# Who pays the tab?

## The distributional effects of UK alcohol taxes

An Institute of Alcohol Studies report

IAS Institute of Alcohol Studies

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# The distributional effects of UK alcohol taxes

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IAS is an independent institute bringing together evidence, policy and practice from home and abroad to promote an informed debate on alcohol's impact on society.

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# Summary

Alcohol tax is widely recognised as one of the most important instruments governments have to address harmful drinking. Yet increases in duty are often resisted because of concerns that they are regressive and will therefore exacerbate inequalities.

It is unclear from the existing evidence how well-founded such fears are in the UK. Poorer households drink less alcohol on average. Yet surveys suggest that lower income households spend a greater share of their incomes on alcohol. On the other hand, surveys also find that alcohol accounts for a *smaller* share of the *expenditure* of lower spending households. This raises the question of whether income or expenditure is a better indicator of a household's economic circumstances. We find both have limitations, but expenditure appears to be somewhat more reliable because of consistent under-reporting of income in official surveys.

In this report, we build on previous studies by directly estimating how much alcohol tax different households pay (rather than using total spending on alcohol as a proxy). Recognising that no indicator of affluence is perfect, we compare alcohol tax burdens across a range of measures: income, expenditure, occupational class, housing size and tenure and car ownership.

Overall, we find little difference between better-off and worse-off households in terms of the share of their income or expenditure accounted for by alcohol duty – at worst alcohol duty is only mildly regressive:

- The very richest 10-20% do pay proportionately less
- The bottom 10% may pay proportionately slightly more, but it is difficult to be certain because of data limitations

However, this varies between different alcohol taxes because of differences in drink preferences:

- Wine duty is clearly progressive
- Beer, cider and particularly spirits duty appear somewhat regressive

In any case, there are three factors that may mitigate the regressivity of any increase in alcohol duty:

- If poorer households are more price sensitive, this means that they will pay less of any increase in alcohol duty
- If the revenue from alcohol duty is used to fund progressive government spending or tax cuts, this will almost certainly offset any negative effect on inequality
- Economically disadvantaged households will see more of the health benefits of higher alcohol duty

Recognising previous analysis has overwhelmingly focused on the impact of alcohol duty on economic rather than social groups, we also looked at how its impact varies by gender, age and region, based on their consumption preferences:

- Overall, women pay significantly less alcohol duty than men – drinks consumed by women account for around two fifths of all alcohol duty

- Yet this varies substantially by product – men pay the vast bulk of beer and cider duty, women pay the majority of wine duty
- Wine duty also has greatest impact on middle aged drinkers, whereas beer, spirits and cider duty are more likely to be paid by younger drinkers
- Households in the North and Midlands pay proportionately more in beer duty, whereas households in Scotland spend the most on spirits duty

As with any fiscal policy, it is important to understand the distributional effects of alcohol duty. Based on the evidence we present here, we find little reason to avoid duty increases out of a concern for inequality.

# Introduction

Alcohol tax is one of the most important instruments that governments have to address harmful drinking. According to Public Health England, "Policies that reduce the affordability of alcohol are the most effective, and cost-effective, approaches to prevention and health improvement" [1]. The World Health Organization agrees that increasing alcohol taxes is a "very cost-effective" way of increasing healthy life [2]. The Organization for Economic Co-operation and Development sees them as a "powerful tool for health promotion" [3]. Real-terms cuts to alcohol duty since 2012 are estimated to have led to over 2,200 deaths in England and Scotland. Conversely, a gradual increase in alcohol taxes above inflation between now and 2032 would be expected cumulatively to save over 5,000 lives [4].

Yet alcohol taxes are not just public health measures. They are also fiscal policies. As with any fiscal policy, distributional consequences are a major consideration. Who shoulders most of the burden of the tax, and who benefits from it? Does it exacerbate or mitigate existing inequalities? Fundamentally, is it fair?

One of the most common objections to increasing taxes on alcohol is the belief that this will penalise the economically disadvantaged. In a discussion of so-called 'sin taxes', *The Economist* worried that such measures "affect low-income households most", and so may "make the poor poorer" [5]. Such arguments have been taken up particularly by alcohol industry trade bodies and right-wing think tanks. The Scotch Whisky Association has dismissed proposals to raise spirits duty as "regressive", while the Wine and Spirit Trade Association urged the government to "ease pressure on cash strapped consumers" by lowering alcohol taxes [6]. In recent years, the TaxPayers' Alliance has also claimed that alcohol duty "hurts the poor" [7] and that wine duty specifically is "deeply regressive and hits those on lower incomes the hardest" [8].

It is not only economic inequalities that concern policymakers. In the past few years, there has been greater recognition that taxes have different effects on different social groups. In a 2017 parliamentary debate, the Labour MP Gill Furniss noted that the Treasury's equalities impact statement on alcohol duty "failed to outline the specific equalities impact with respect to gender", and suggested that future Budgets should take into consideration differences in drinks preferences between men and women [9]. The Women's Budget Group has also regularly criticised government cuts to alcohol duty for disproportionately benefitting men [10-12]. Several governments have introduced 'gender budgeting': estimating the differences in the impact of taxation and spending measures on men and women, and using this to guide policy [13]. Age has also emerged as a major political divide in modern Britain, and consequently there have been calls for the intergenerational impact of tax policies to receive more attention [14]. Similarly, the gap in prosperity between the different UK regions has been a major political concern in recent times, and is expected to be a focus of the forthcoming Budget in March 2020 [15].

This report seeks to identify some of the winners and losers of UK alcohol tax. The first part looks at whether alcohol tax is regressive – that is, whether it places a disproportionate burden on the poor. It begins by reviewing the existing evidence and literature on the question, outlining in detail the methodological difficulties in defining and identifying poorer groups. It then presents new analysis of UK survey data, examining how the estimated financial burden of each alcohol tax varies, using a range of measures of economic advantage and disadvantage. Finally, it attempts to contextualise these results, by identifying different factors that may mitigate any regressive effect of alcohol taxes.

The second part turns to the financial impact of different alcohol taxes on different genders, age groups and regions. It produces new estimates, again drawing on the best available survey data, for how the burden is distributed between these different groups.

Discussion of the distributional impact of alcohol taxes is often based on speculation and supposition. In this report, we add more robust evidence, in the hope of contributing to a more informed debate.

# Part 1: Does UK alcohol tax disproportionately fall on the poor?

## Previous evidence

We begin by reviewing existing analysis and evidence on the distributional effects of alcohol taxes. First, we outline the international academic literature. We then turn to the UK and look at how levels of drinking vary between socio-economic groups. Such figures do not account for differences in households' ability to pay, and so we then look at analyses of the proportion of income and expenditure that spending on alcohol accounts for. Since the results for income are different to the results for expenditure, we then review the literature on whether income or expenditure is a better measure of a household's economic circumstances.

### *International academic literature*

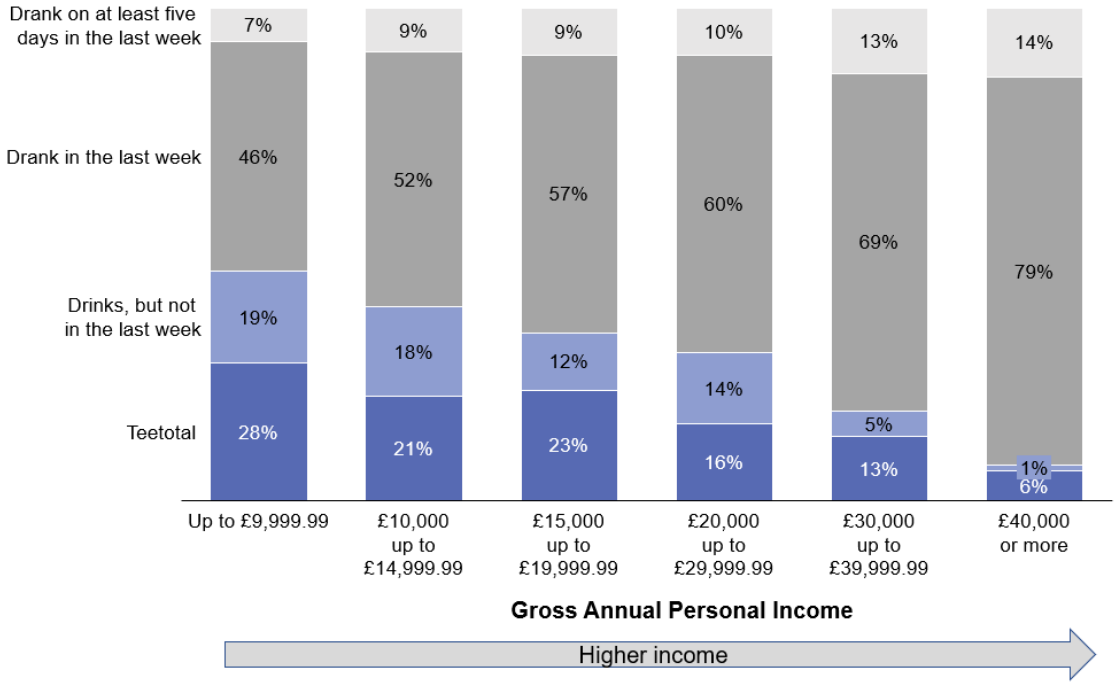
In general, a tax is said to be regressive if it costs the poor a higher share of their income than the rich. As we have seen, many people believe (or perhaps just assume) that alcohol tax is, in this sense, regressive. Proponents of lower duty rates have claimed that "There is little argument in the academic literature about the regressivity of alcohol taxes" [16]. This is an overstatement.[1] While studies in some countries (for example, Australia [18], the US [19] and South Africa [20]) have found that alcohol taxes place a proportionately greater burden on the poor, others have found a different, or more complex, relationship. For instance, Ashton et al find that households towards the bottom and middle of the income distribution in New Zealand pay around the same share of their income in alcohol taxes, but that the highest earners pay proportionately less tax [21]. By contrast, Sassi et al find that alcohol taxes are slightly progressive (i.e. the rich pay a higher share of their income) in Chile, Turkey and Poland [22].

### *Alcohol consumption by income and socio-economic status in the UK*

In any case, given the vastly different alcohol policies, drinking patterns and economic structures of different countries, these results are not a reliable guide to the impact of British alcohol taxes. For that, we need to look at evidence from the UK. A good place to start is with data on levels of alcohol consumption. The Office for National Statistics' (ONS) Opinion and Lifestyle Survey shows that the poorer a person is, the less likely they are to drink or drink frequently. As figure 1 shows, 28% of people earning under £10,000 a year are teetotal, compared to just 6% of those earning over £40,000. 14% of those in the highest income group drink alcohol five times a week, compared to 7% of those in the lowest income group.

1 As even the libertarian critic of alcohol duty, Christopher Snowdon, appears to have acknowledged more recently, referencing studies that show that alcohol is a "partial exception" to the regressivity of consumption taxes [17]

*Figure 1: Frequency of drinking alcohol by income – Great Britain, 2017 [**23**]*




The same pattern holds for other measures of prosperity and socio-economic status. The unemployed and economically inactive drink less frequently than those in employment (figure 2). Those with lower educational attainment and of a lower occupational class drink less frequently than those higher up the ladder (figure 3).

*Figure 2: Frequency of drinking alcohol by employment status – Great Britain, 2017 [**24**]*

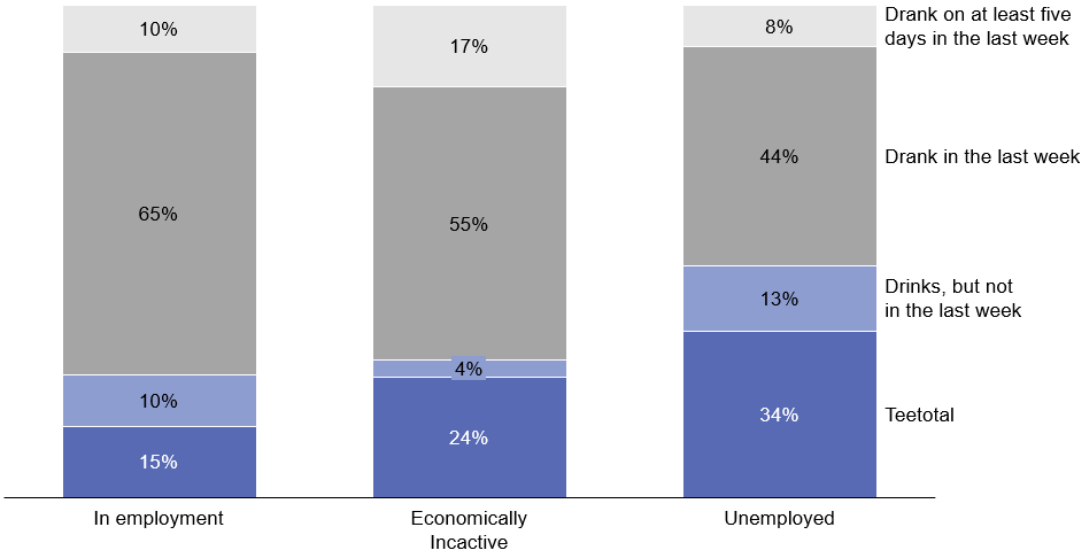
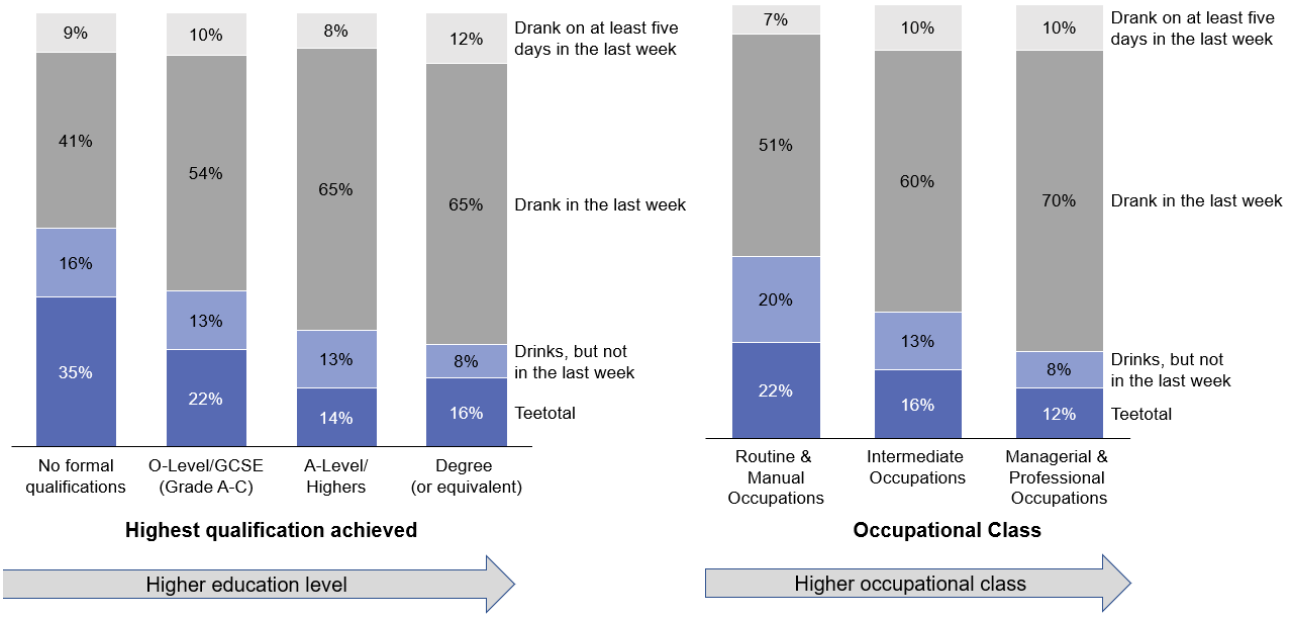
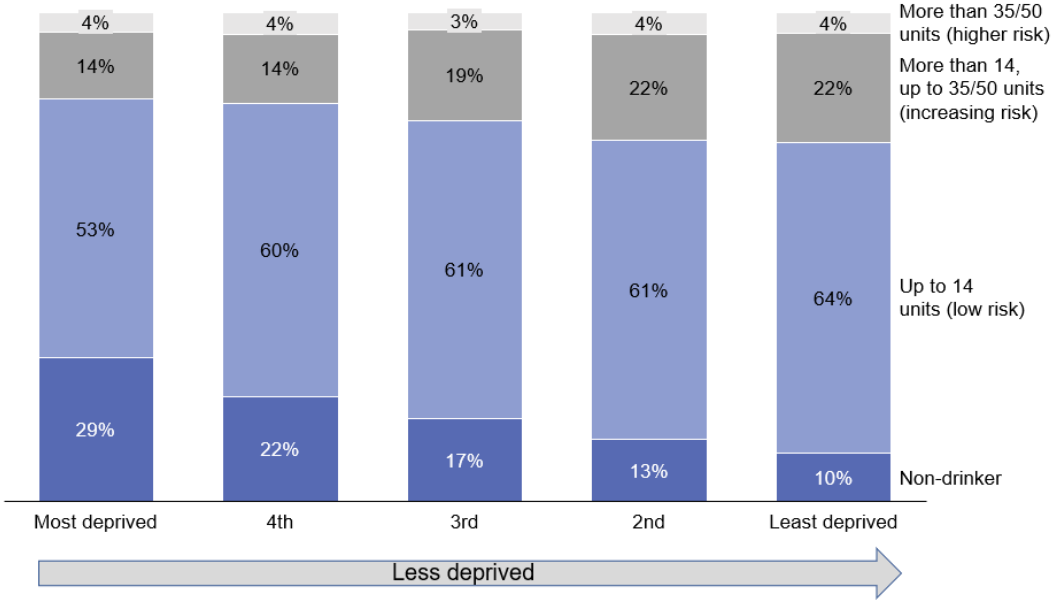


*Figure 3: Frequency of drinking alcohol by educational attainment and social class – Great Britain, 2017 [**23**]*




Furthermore, the Health Survey for England shows that people living in the most deprived areas are least likely to exceed guideline levels of drinking. 18% of people living in the most deprived quintile drink more than 14 units a week, compared to 27% in the least deprived quintile, as figure 4 shows [24]. Comparable surveys find much the same pattern for Scotland [25].

*Figure 4: Weekly alcohol consumption by index of multiple deprivation – England, 2018 [**24**]*

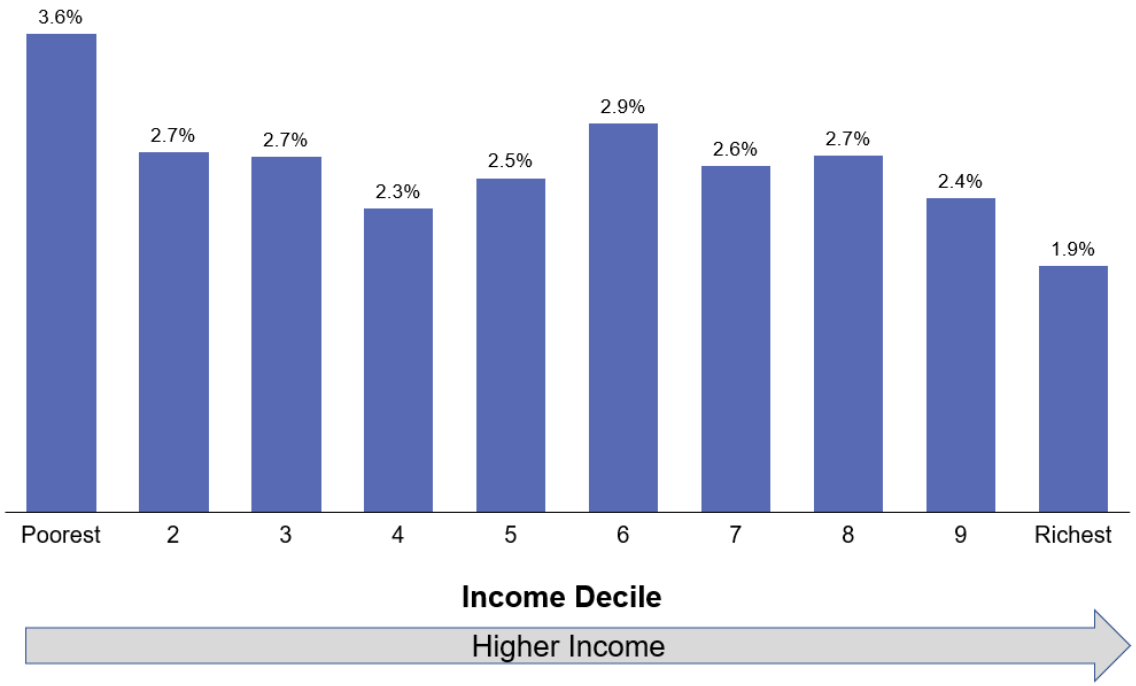


While all of this indicates that poorer people drink less, and therefore likely pay less alcohol tax in absolute terms, this does not necessarily mean that alcohol tax is progressive. It may still be that relative to their ability to pay, poorer people face a greater burden from alcohol tax. Paying £100 in alcohol duty is more onerous for a household bringing in £10,000 a year than £120 is for a household on £60,000.

To account for this, we need to look at how much alcohol duty households pay as a proportion of their total financial resources. The most detailed and reliable source of data on British household spending and economic circumstances is the Office for National Statistics' Living Costs and Food survey (LCFS). However, the version of this dataset that is generally available to researchers does not provide the relevant information to estimate a household's alcohol tax payments directly. As a result, previous analyses have tended to use a household's spending on alcohol, which is more easily available, as a proxy for how much they pay in alcohol tax. As we shall see, this approach has significant limitations. In this report, therefore, we have estimated alcohol duty payments more directly using a version of the survey only available to researchers on application under secure access conditions.

In its 2016 Green Budget, the Institute for Fiscal Studies (IFS) found that households in the bottom 10% of the income distribution of the 2013 LCFS pay the highest share of their income on alcohol (3.6%), whereas the top 10% pay the lowest share of their income on alcohol - 1.9% (figure 5) [26]. This would appear to indicate that alcohol tax is regressive.

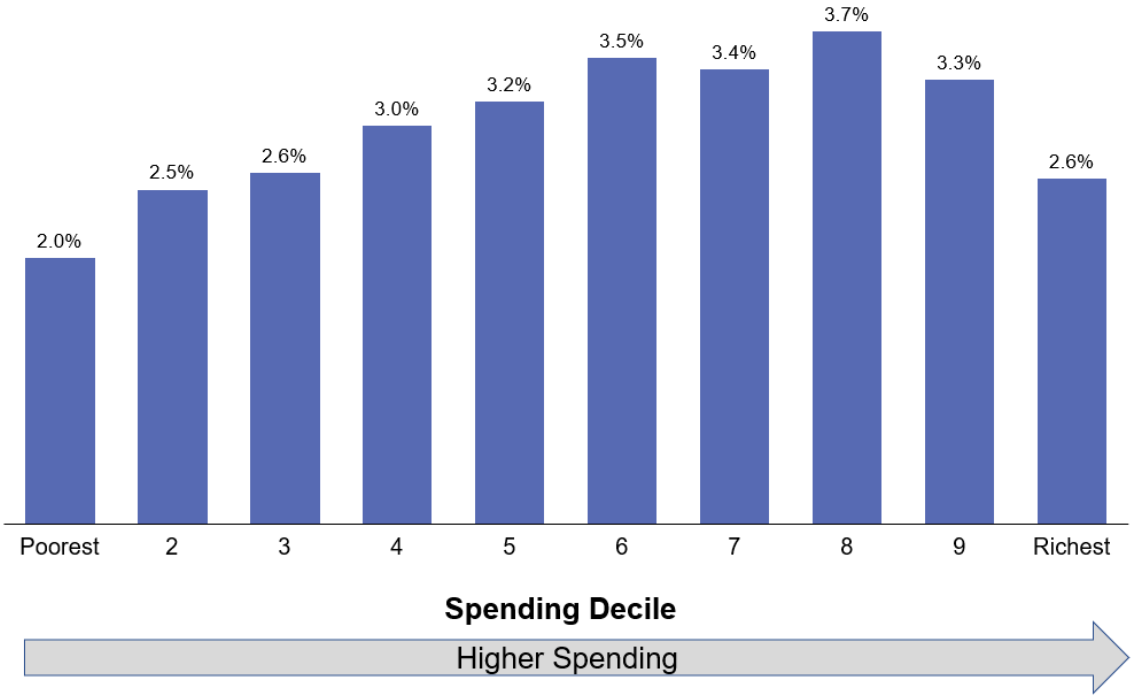
*Figure 5: Share of income spent on alcohol by income decile – UK, 2013[2] [26]*




2 Data kindly provided by and reproduced with the permission of Peter Levell.

Yet income is not the only way to assess how well-off a household is. Sometimes economists prefer to use household spending as a measure of poverty or affluence.[3] When the IFS compared the share of a household's total spending accounted for by alcohol, they found an almost progressive pattern (figure 6). The bottom 10% of spenders spend the least on alcohol relative to their budget, and moving up the distribution, alcohol's share of household budgets rises – at least up to the eighth decile.

*Figure 6: Share of total household expenditure spent on alcohol by spending decile – UK, 2013[4] [**26**]*




### *Income vs expenditure as a measure of household prosperity*

If alcohol expenditure looks regressive on the basis of income, but progressive on the basis of spending, the natural question is whether expenditure or income is a better indicator of how rich or poor a household is. The answer is that neither are perfect, but there are both theoretical and practical reasons to prefer spending, at least when it comes to UK survey data.

Theoretically, we would expect spending to be less volatile than income, since households can use borrowing and saving to 'smooth' their spending over their lifetime. Consider the following cases:

- A pensioner running down their savings to supplement their pension
- A student borrowing money to support themselves through their degree as they anticipate they will land a lucrative graduate job
- A self-employed person who dips into their savings to help them through a bad year for their business.

3 Oddly, the ONS' own analysis splits the difference – ranking households by income decile, but expressing their spending on alcohol as a share of total expenditure [27]. As might be expected this produces a distribution somewhere in between figures 5 and 6, without a clear recognisable trend.

4 Data kindly provided by and reproduced with the permission of Peter Levell.

In each example, the person's spending better reflects their long-term economic circumstances than their income. Indeed, using US data, Lyon and Schwab find that aggregating incomes over five years (which reduces some of this income volatility) partially reduces the apparent regressivity of alcohol taxes [28]. Yet even this may be too short a period to look at: many students and retirees will see little change in their income over five years.

Likely more significant are practical issues with data quality. There is strong evidence that incomes at the lower end of the distribution are systematically under-reported in household surveys [29,30]. A significant number of respondents to the LCFS report very low incomes, but relatively high expenditure [29]. This is most likely caused by the under-reporting of means-tested benefits – respondents may not know exactly how much they receive, or which benefits they draw on. Comparing against aggregate government data, Brewer et al find that the Living Costs and Food Survey accounts for just 50% of tax credits and 68% of income support [31].

By contrast, Brewer & O'Dea find that households with low reported spending in the LCFS are more recognisably poor according to a number of independent criteria [29]. Households reporting low spending generally report low incomes. They are also less likely than those with reported low incomes to have a range of household goods, including computers, internet connection, cars, dishwashers and washing machines. Spending is also a better predictor than income of the number of rooms a household had in their home.

Further evidence that spending reports are more reliable than income comes from analysis of the Canadian Survey of Family Expenditures, which has found similar anomalies to the LCFS. Until 2010, respondents to the Canadian survey were asked to provide more detail if there was a discrepancy of more than 20% between their reported income and spending. Brzozowski & Crossley show that these cases tended to reveal under-reported income far more often than over-reported expenditure [32].

All of this suggests that a significant proportion of those identified as low income in the LCFS are misclassified, whereas those who report low spending are more likely to actually be poor. This indicates that figure 6 (share of expenditure spent on alcohol) is more reliable than figure 5 (share of income spent on alcohol), and so alcohol spending is more likely to be progressive than regressive. Yet even though household spending is a better indicator of affluence than income, it is still imperfect. Richer people save a higher proportion of their income [33], and do not spend all of their savings by the end of their lives [34]. Conversely, poorer people may be more likely to spend more than they earn over the course of their lifetimes. Moreover, even though expenditure data is thought to be more reliable than income data on the whole, there is still some evidence that it too suffers from under-reporting, and that higher income households under-report their spending by more [29]. Consequently looking only at spending risks understating the affluence of the rich, overstating how well-off the poor are, and so underestimating the regressivity of alcohol tax.

## New analysis

We build on the previous analysis in three ways. First, we directly estimate how much different households pay in alcohol duty, rather than using their spending on alcohol as a proxy. This is important because spending may produce a biased picture if tax accounts for a higher share of the price paid for alcohol by different groups. For example, around a third of the price paid by consumers for wine is tax, but only a fifth of beer prices [35]. Since richer households tend to drink more wine, this would suggest that the analysis above underestimates the amount of alcohol

duty richer households pay compared to the poor. On the other hand, alcohol duty accounts for a smaller share of the price of more expensive products. For example, the duty on a litre of 4% ABV beer is 76p. Yet this duty represents 19% of the retail price of a craft beer sold for £4/litre, but 38% of the retail price of a standard beer sold for £2/litre. Since richer households tend to buy more expensive alcohol, this would suggest that our analysis so far overestimates the amount of alcohol duty richer households pay compared to the poor.

Second, in light of this debate over how best to identify richer and poorer households in survey data, we decided to test the hypothesis that poorer households spend proportionately more on alcohol duty using a range of different indicators of prosperity. Given the measurement issues with the standard metrics of income and expenditure, we decided to look not only at those two, but also at occupational class and other signifiers of living standards, such as housing size, housing tenure and car ownership.

Third, rather than looking only at alcohol as a whole, we separately estimate the distributional impact of beer, wine, spirits and cider duties.

## Methods

We pooled data from three waves of the Living Costs and Food Survey (LCFS): 2013, 2014 and 2015/16 [36].[5] The LCFS interviews a random sample of UK households, and asks detailed questions about the income and major expenditures of each adult (16+) member of the household. Each adult is also asked to keep a spending diary over the course of two weeks. Interviews are spread evenly across the course of the year to avoid the results being influenced by seasonal variation [37].

We took transaction-level data from the spending diaries, and for every alcohol purchase, estimated the amount of duty paid. This required us to estimate the volume of drink purchased and, for beer and spirits, the strength of the drink. For most purchases, the exact volume of the product was captured in the survey. However, for some, we had to make assumptions about the size of containers – these are laid out in appendix A. The strength of the product was not captured in the survey – appendix B provides details of the assumptions we made about the alcoholic content of different drinks, based on market research data.

The amount of alcohol duty paid on each transaction was estimated by applying the duty rates in operation at the time of the survey. We then calculated the average duty paid for each product (beer, wine, spirits, cider) as a share of income and expenditure across all survey respondents. Households recorded as having extremely low incomes – either negative or less than a third of their total expenditure – were excluded from the analysis.

The survey estimates were multiplied by scaling factors to ensure they match official statistics. For example, the unadjusted survey estimate is that across the sample spirits duty accounts for 0.21% of household disposable income on average. Yet official government spirits duty receipts [38] account for 0.26% of household disposable income in the national accounts [39]. To correct for this discrepancy (most likely due to under-recording of alcohol purchases), we multiplied the estimated spirits duty share of disposable income for each household by a scaling factor 1.22. Similar adjustments were made for beer, wine and cider duty as a share of income and expenditure. Overall, this increased the estimate of alcohol duty as a share of disposable income by 16%, and

5 The most recent available wave of the survey - 2016/17 - was not usable as it was missing data on the quantity of alcohol purchased for a large proportion of the transactions

as a share of expenditure by 9%. It also shifted the relative share of alcohol duty towards beer and spirits duty and away from wine duty.

For each estimate, we calculated a 95% confidence interval using the standard errors and assuming a normal sampling distribution.

Note that our analysis assumes that households pay the full amount of duty chargeable on a product. In practice, this assumption may not hold, since alcohol duty is levied on producers, and they or retailers may choose to absorb some of the alcohol duty, rather than passing it on to consumers in full. This may lead us to overstate the regressivity of alcohol duty, since cheaper products are less likely to pass duty onto consumers in full [40].

## Results

### *Replicating previous analysis*

We started by replicating the IFS' analysis for our more recent data, calculating the proportion of equivalised household disposable income or expenditure spent on alcohol in each decile. As figures 7 and 8 show, we find broadly the same pattern as the IFS (though not quite as smooth) – higher earning households appear to spend a lower proportion of their income on alcohol, but higher spending households appear to spend a higher share of their budget on alcohol. That said, it is worth noting that beyond the very top and bottom of the distribution, these differences are not statistically significant, with the confidence intervals mostly overlapping.

*Figure 7: Alcohol spending as a share of equivalised disposable income by income decile*

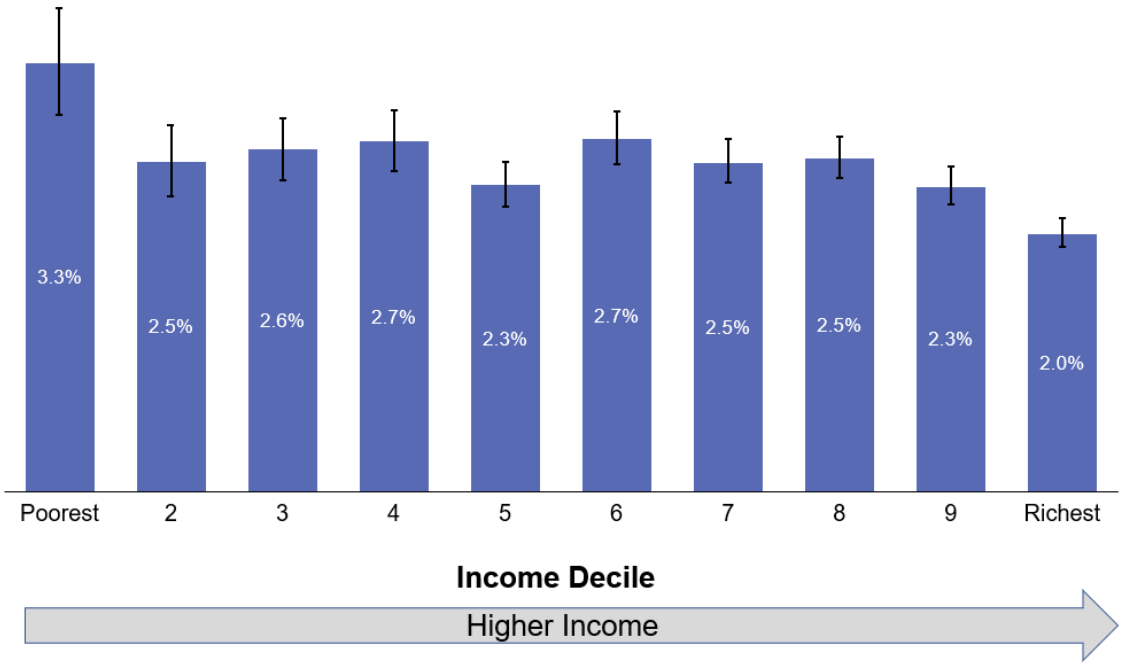
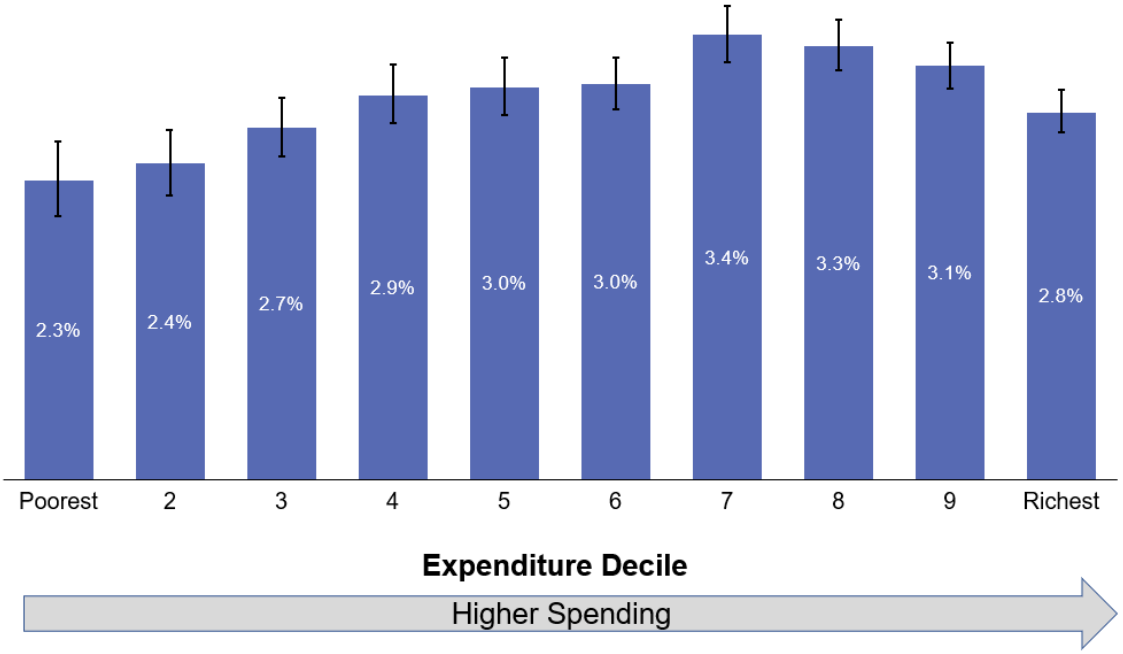
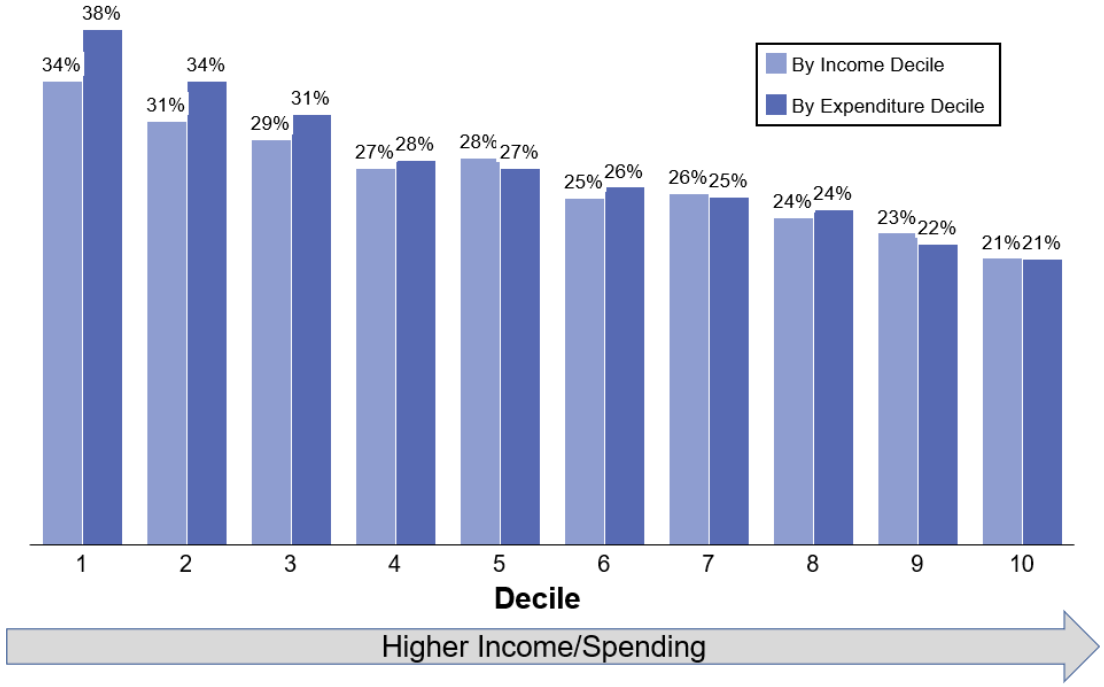


*Figure 8: Alcohol spending as a share of expenditure by expenditure decile*




Yet as we have already suggested, the amount that a household spends on alcohol is not necessarily a good proxy of how much alcohol duty they pay. Figure 9 confirms that duty accounts for over a third of the money spent on alcohol by the poorest groups in society, but around a fifth for the richest.

*Figure 9: Alcohol duty as a share of alcohol expenditure by income/expenditure decile*



### *Overall distributional effect of alcohol duty*

As a result, when we turn to our direct estimate of the amount of alcohol duty paid by different households, figure 10 shows that duty looks more clearly regressive on an income basis. Moreover, figure 11 shows that duty no longer looks progressive on an expenditure basis, but rather flat across most of the income distribution, with the highest spenders paying the least duty and the lowest spenders paying the most.

*Figure 10: Alcohol duty as a share of equivalised disposable income by income decile*

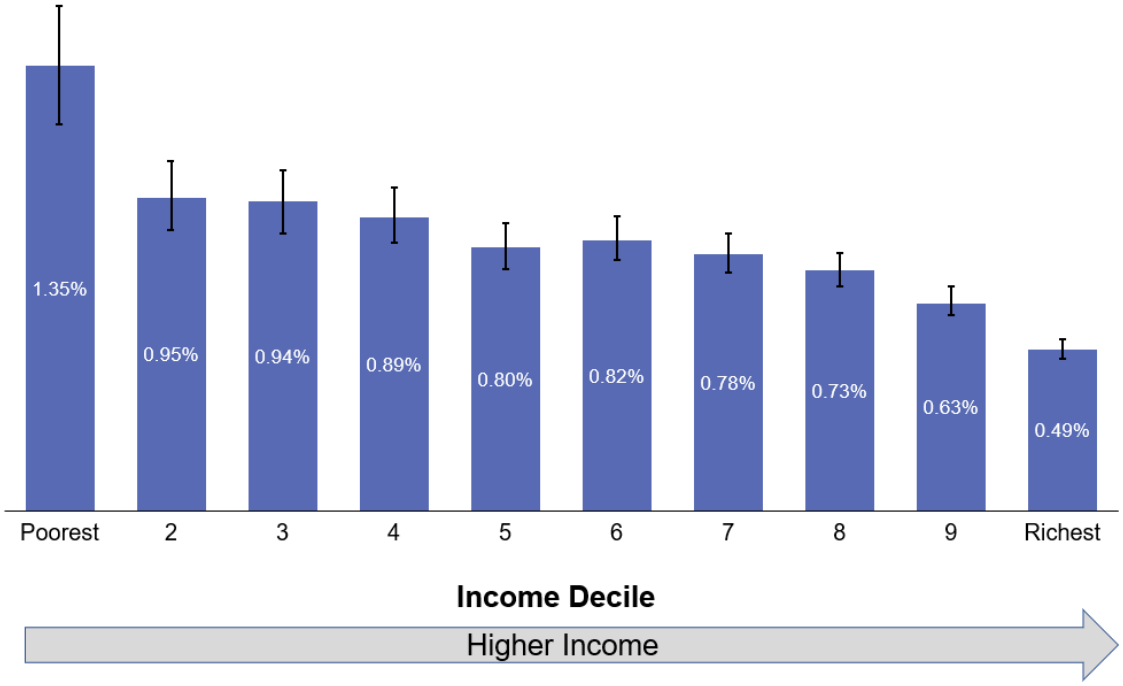
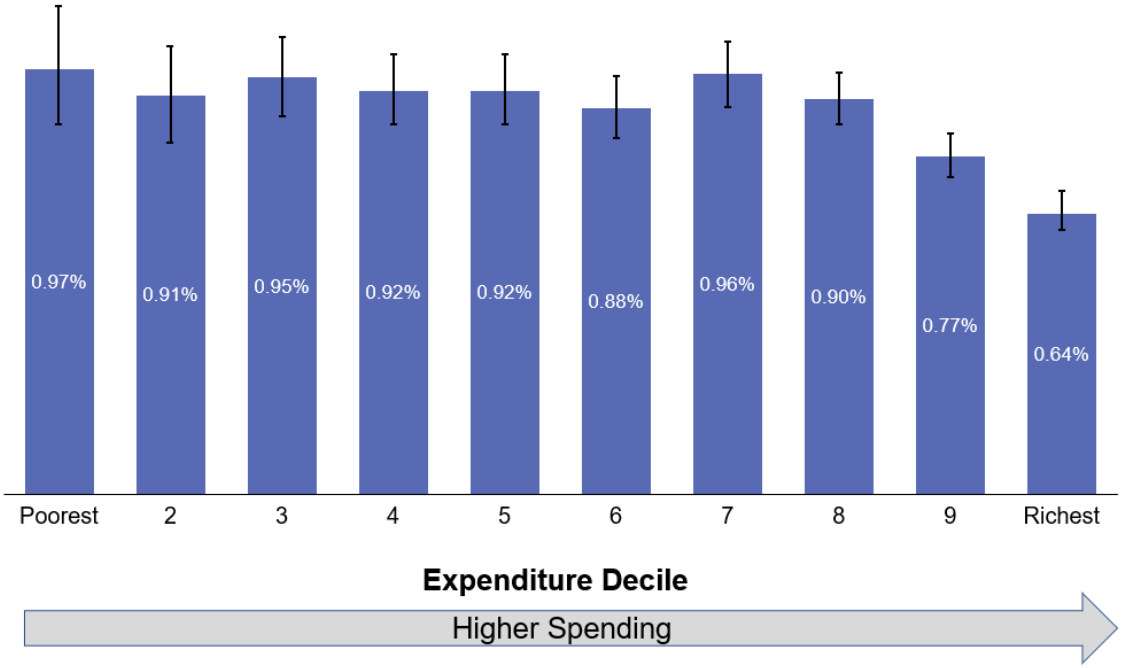



*Figure 11: Alcohol duty as a share of expenditure by spending decile*



That said, it is worth noticing that on an expenditure basis, the confidence intervals on all of the eight bottom deciles overlap, so the only groups paying statistically significantly lower alcohol tax in proportionate terms than the rest are the top 20%. On an income basis, it is also the case that the top two deciles pay clearly less duty in proportionate terms. However, looking at the point estimates,[6] the downward slope is more clearly defined, and the bottom decile pays a significantly higher share of its income in duty than other households.

As noted above, one reason why alcohol duty may appear more regressive on an income basis is because some households in the survey have understated their incomes. Of course, we cannot know for certain which households these are. However, one approach is to strip out households from the analysis that have an especially large discrepancy between their expenditure and their incomes. Figure 12 reproduces the analysis above, excluding households that reported spending more than double their reported incomes. This slightly flattens the distribution, with the proportion of income spent on alcohol duty in the lowest decile falling by a full 0.1%. Overall, though, the distribution remains downward sloping.

*Figure 12: Alcohol duty as a share of equivalised disposable income by income decile (excluding households reporting spending >200% of reported income)*

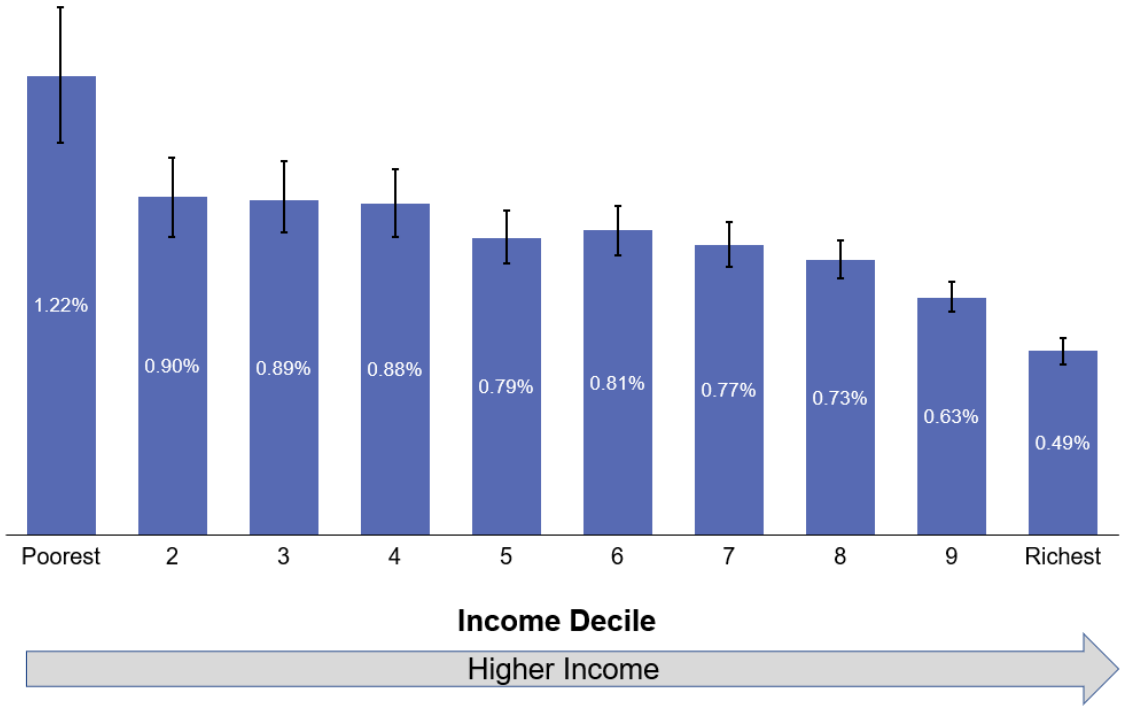
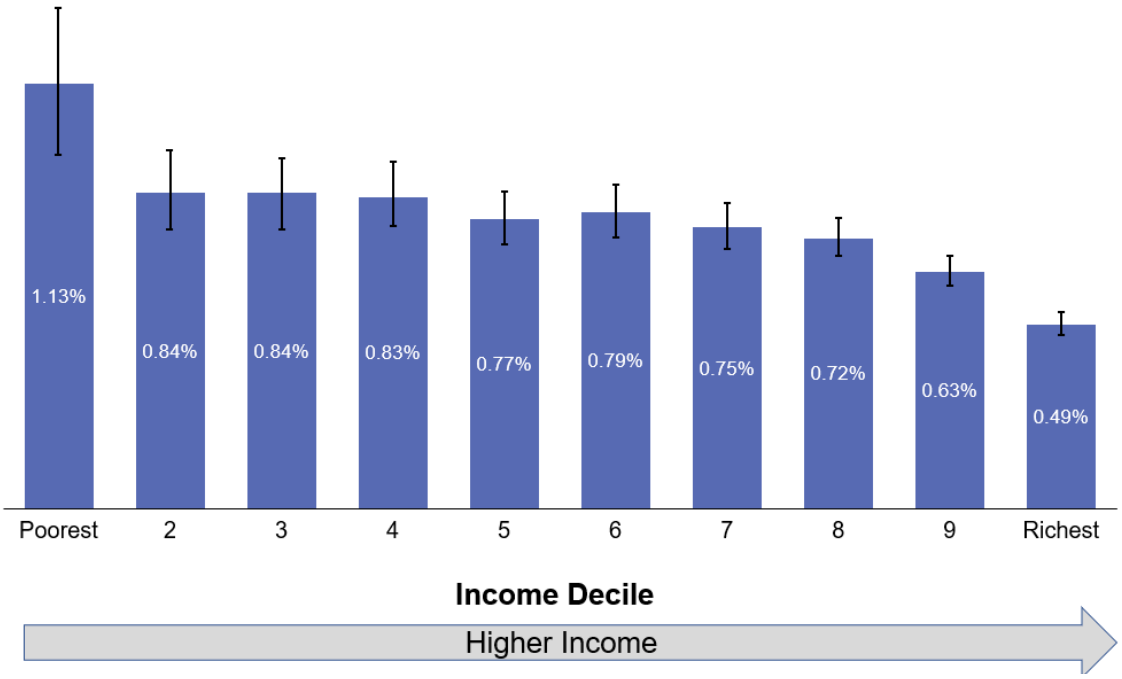



Figure 13 shows the same analysis if we lower the threshold for exclusion further to households spending over 150% of their reported income. By this point, the distribution on the basis of income starts to look more like the distribution on the basis of expenditure, with the two top deciles spending clearly the least, but with little difference between the households in the middle. Spending on alcohol duty in the bottom decile, though it remains clearly the highest point estimate, is no longer significantly higher than spending on duty in the second decile. Of course, as the exclusion criterion becomes stricter, the risk of excluding valid reports increases. It is extremely unlikely that many households really are spending more than three times their

6 The numbers presented in the charts, which represents the central estimates, leaving aside the uncertainty around these

annual income, but far more plausible that households really are spending 50% more.[7] At the same time, even at the 150% threshold, it is entirely possible that there are inaccurate reports remaining in the sample.

*Figure 13: Alcohol duty as a share of equivalised disposable income by income decile (excluding households reporting spending >150% of reported income)*




Since neither reported income nor reported expenditure are entirely reliable indicators of a household's affluence in the LCFS, we looked at a range of other characteristics to triangulate these against. All of these have clear limitations taken on their own. However, in combination, they can help us to build up a picture of the distributional consequences of alcohol tax.

First, we looked at occupational class. While the relationship is not perfect, in general we would expect people of higher occupational classes to be richer. Crucially, occupational class is less likely to be affected by temporary fluctuations than income or spending, and so may in some cases be a better guide to a household's long-term circumstances.

The LCFS categorises households according to the occupational class of the household reference person – the person who owns the accommodation, is responsible for rent, or who has the highest income. Using these classifications, we analysed the proportion of income and expenditure spent on alcohol duty by households of different occupational classes.

7 Particularly since the data comes from two week diaries – in such a short period of time, it is quite possible that people may incur large exceptional expenditures.

*Figure 14: Alcohol duty as a share of income/expenditure by occupational class*

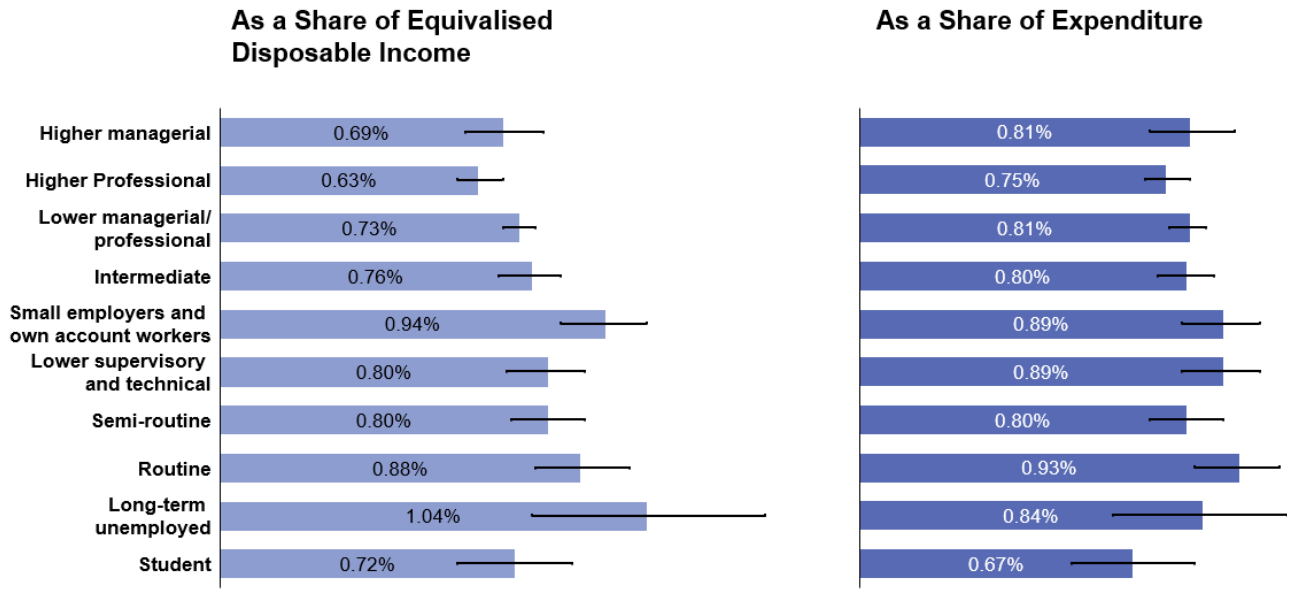



Figure 14 shows that alcohol duty accounts for a similar share of expenditure for people of all occupational classes in the LCFS. People from lower occupational classes do appear to spend more of their income on duty, but this is not statistically significant. At worst, then, occupational class suggests that duty is only mildly regressive, and perhaps not regressive at all.

The sort of accommodation a household lives in provides another indicator of how well-off they are. Though obviously this is influenced by a number of factors, including age and location, we would generally expect those eligible for social housing to be poorer than those in private rental accommodation, and those that can afford to own their own homes to be richest. Figure 15 shows how spending on alcohol duty varies by housing tenure. It shows that homeowners and those in social housing spend similar amounts on alcohol duty as a share of income/expenditure, but that people in private rental accommodation spend slightly less. Thus looking at duty payments on the basis of housing tenure does not suggest that alcohol duty is regressive.

*Figure 15: Alcohol duty as a share of income/expenditure by housing tenure*

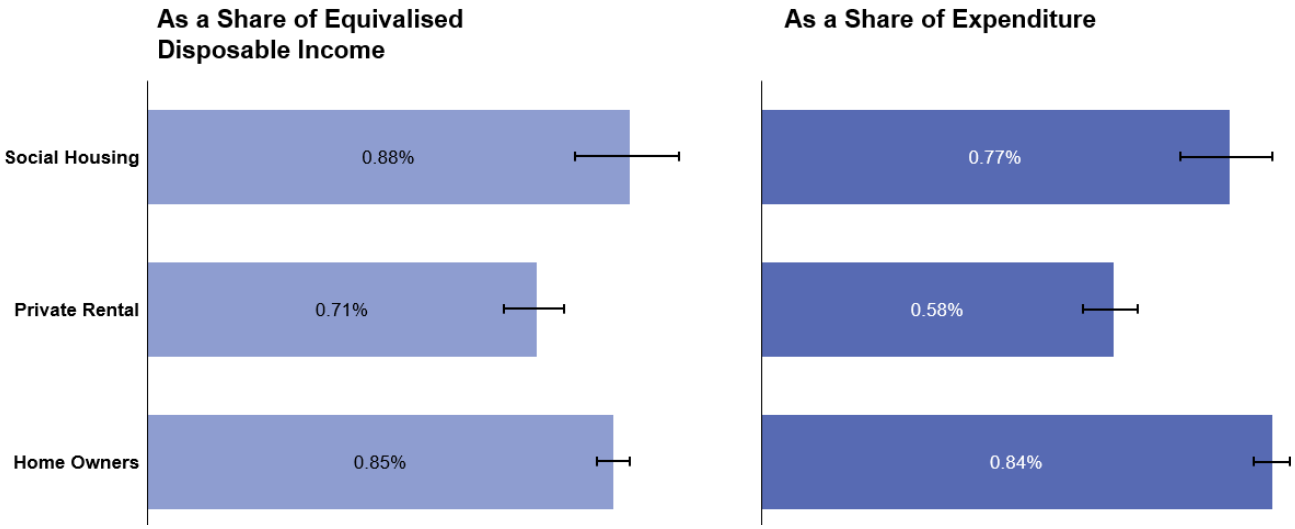
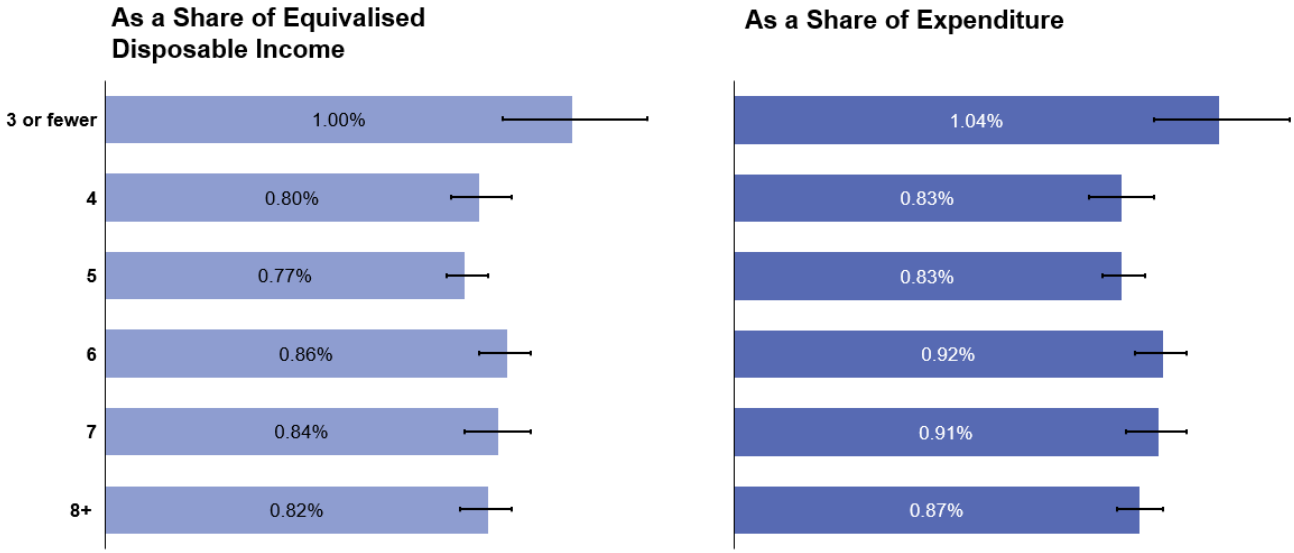


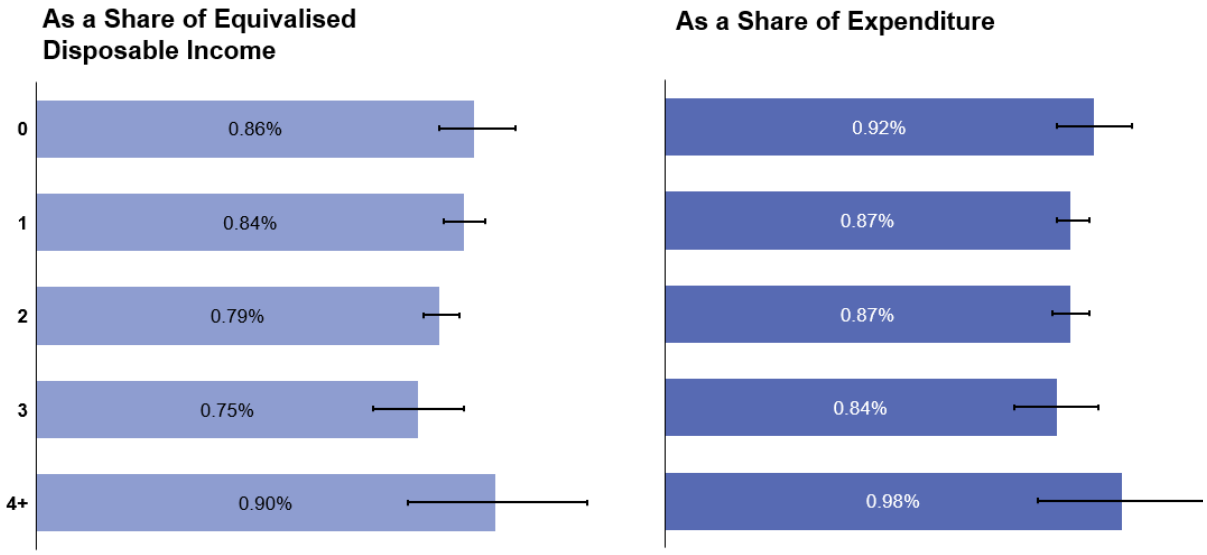
Figure 16 shows how alcohol duty spending varies by *size* of house. It shows little clear relationship between the number of rooms in a household's home and the proportion of their income or expenditure accounted for by alcohol duty. It is noticeable, however, that those in the smallest houses (three rooms or fewer) do appear to be spending more on duty – though this difference is not significantly different from other households. Again, this is evidence that if alcohol duty is regressive, it is only mildly so.

*Figure 16: Alcohol duty as a share of income/expenditure by number of rooms in house*




Car ownership is another measure of a household's living standards. Figure 17 plots spending on alcohol duty against the number of cars and vans that a household has access to. It shows little meaningful difference between different levels of car ownership.

*Figure 17: Alcohol duty as a share of income/expenditure by number of cars and vans*




Put together, these analyses suggest that the burden of alcohol taxes are split fairly evenly throughout most of the socioeconomic distribution. However, the very richest 10-20% pay slightly

less as a share of their incomes and budgets. On some, but not all indicators, the very poorest pay slightly more in proportional terms, but it is impossible to be sure because of data limitations. Thus alcohol duty is at worst marginally regressive.

### *Distributional effect of alcohol duty by beverage type*

As well as the overall distributional effect of alcohol duties together, we also looked at the distributional effects of taxes on different beverage types. Figure 18 shows how the proportion of household income spent on different alcohol duties varies by income decile. Figure 19 shows how it varies as a share of spending by expenditure decile.

*Figure 18: Alcohol duty as a share of income by income decile by beverage type*

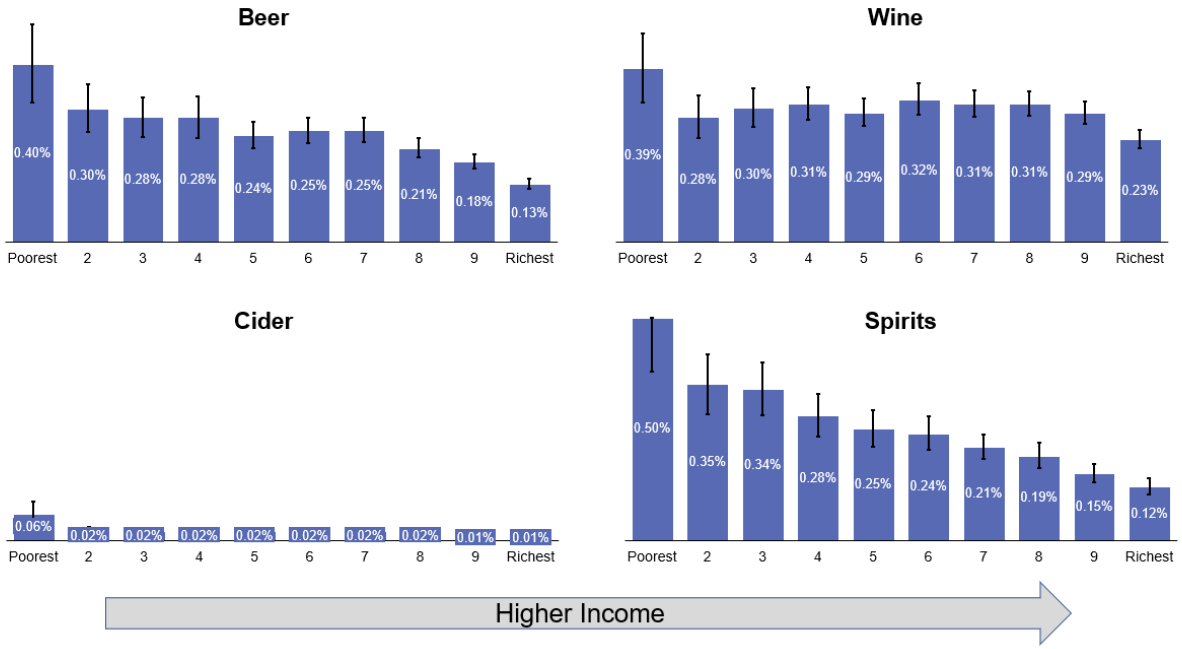
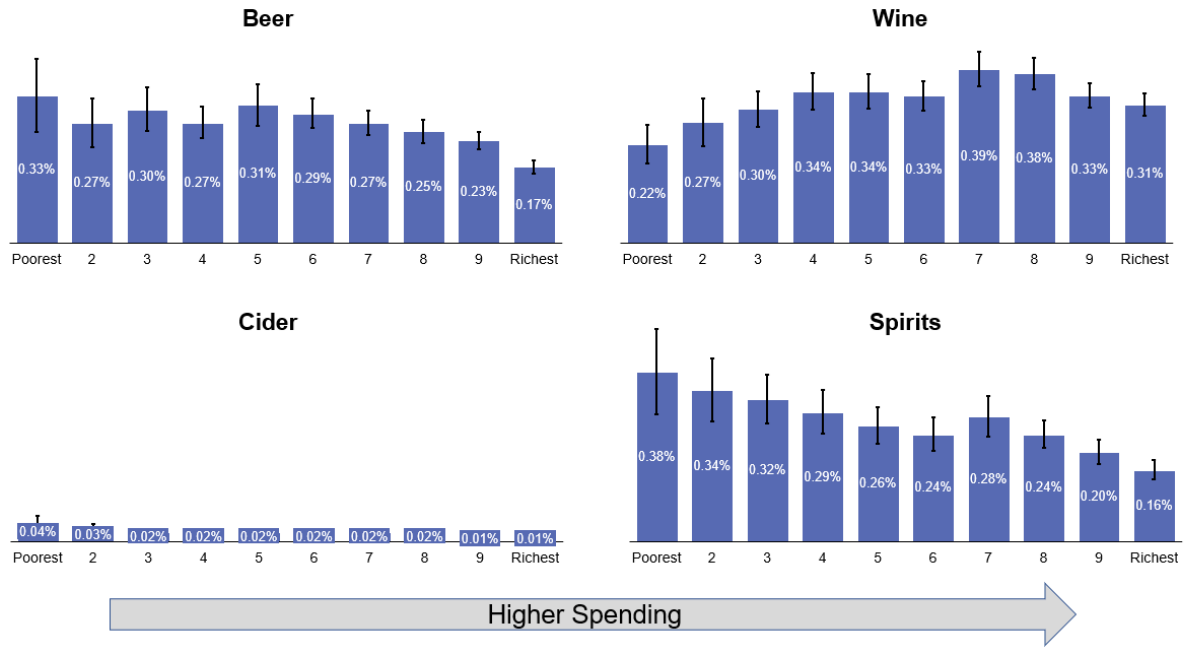



*Figure 19: Alcohol duty as a share of spending by expenditure decile by beverage type*



Unsurprisingly, the numbers in figure 18 and 19 reflect the overall pattern of alcohol duty in that duty looks more regressive on an income basis compared with an expenditure basis. That said, there are clear differences by beverage type. If any alcohol tax is regressive, it is spirits duty, which appears clearly regressive on an income basis, and somewhat regressive even on an expenditure basis. Beer duty seems fairly regressive on an income basis, but rather flat on an expenditure basis. Cider tax also appears to have a slightly higher burden on the poor, but because people drink less cider than other products, and because cider tax rates are relatively low, cider duty accounts for a much lower share of income and expenditure than other duties. Wine duty, by contrast, looks to be somewhat progressive – at least on an expenditure basis.

Figures 20 to 23 show different alcohol duties as a share of income and expenditure by occupational class. These tell broadly the same story. Beer, cider and spirits duty appear to account for a slightly larger share of resources of those in lower occupational classes. However, these differences are not statistically significant. Wine duty, by contrast, accounts for a higher share of the income and expenditure of those in higher occupational classes, and this difference *is* statistically significant – semi-routine, routine workers and the unemployed pay clearly less wine duty than professional workers.

*Figure 20: Beer duty as a share of income/expenditure by occupational class*

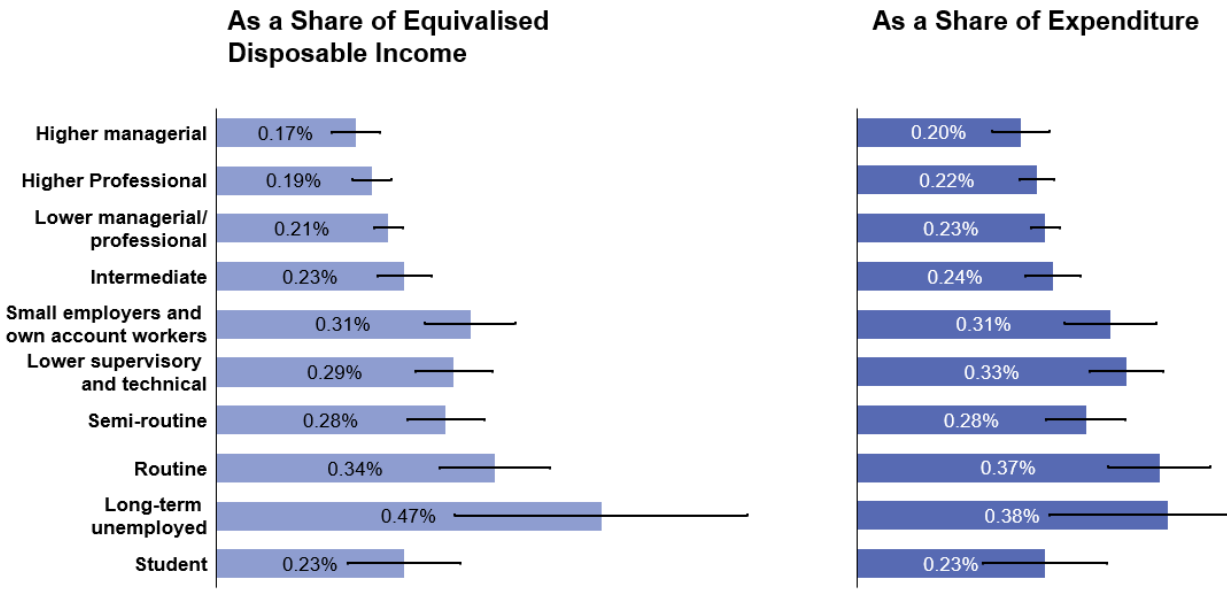


*Figure 21: Cider duty as a share of income/expenditure by occupational class*

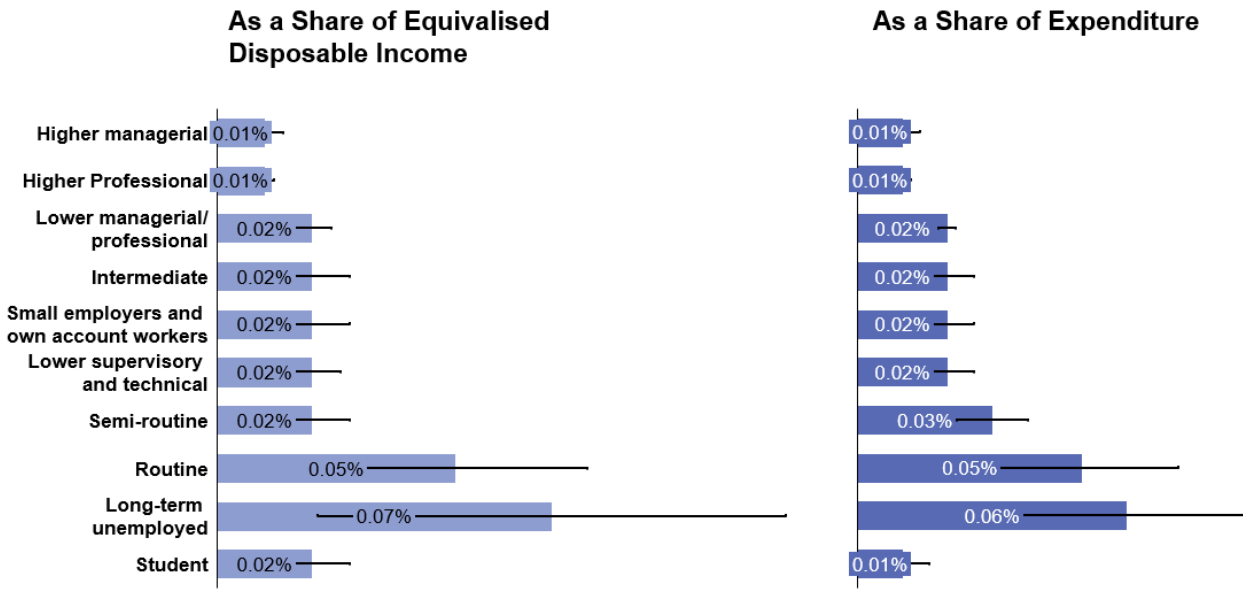



*Figure 22: Wine duty as a share of income/expenditure by occupational class*

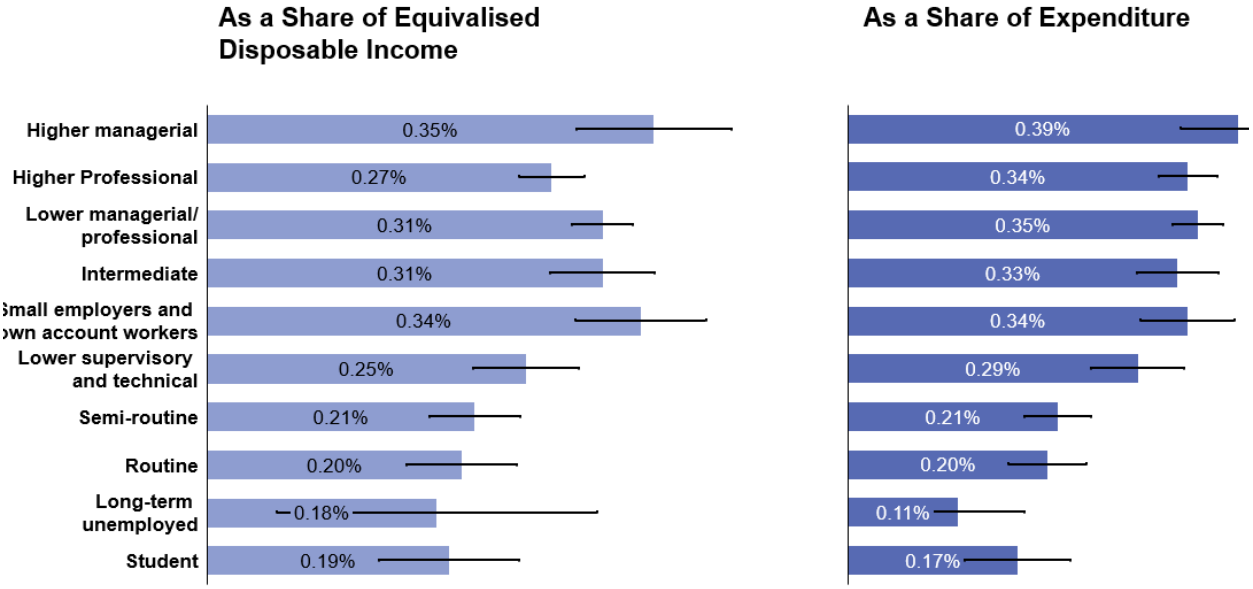
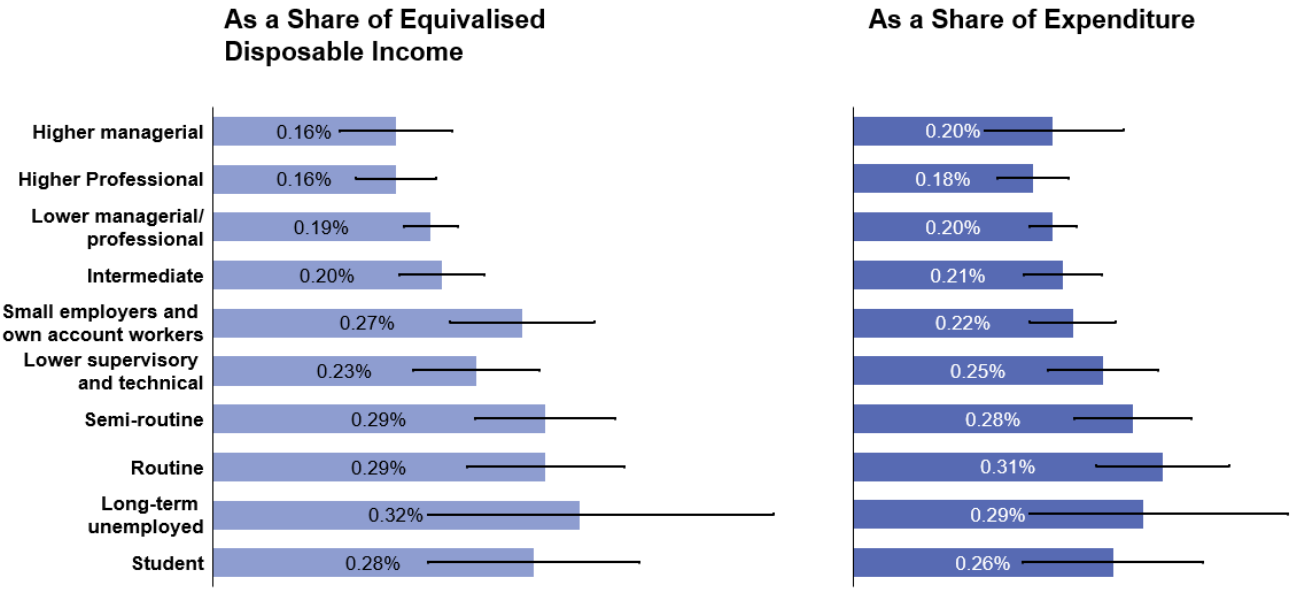


*Figure 23: Spirits duty as a share of income/expenditure by occupational class*




This emerging picture is supported by the analysis in appendix C. Homeowners, people with bigger houses and more cars all spend significantly more of their incomes and budgets on wine duty. The other alcohol duties look somewhat regressive on these other measures, but not significantly so.

Taken together, these results suggest that wine duty is clearly progressive, whereas beer, cider and spirits are mildly regressive, with spirits duty more regressive than beer or cider duty.

## Factors mitigating any regressive impact of alcohol taxes

To this point, we have considered the average level of alcohol tax currently paid by different groups in isolation. In evaluating government policy, though, we are more interested in the impact of *changes* in alcohol taxes, and in the broader consequences of such changes beyond their effects on alcohol duty payments. When evaluating the distributional impact of an increase or decrease in alcohol duty, therefore, there are three additional considerations we should take into account.

First, there may be differences in price sensitivity between richer and poorer households. If so, then the current level of tax paid by a household is not necessarily a reliable guide to the incremental impact of any additional tax. If poorer households reduce their alcohol consumption by more in response to an increase in alcohol taxes, then the additional amount of tax they end up paying will be less than you would expect from the amount they currently pay.[8]

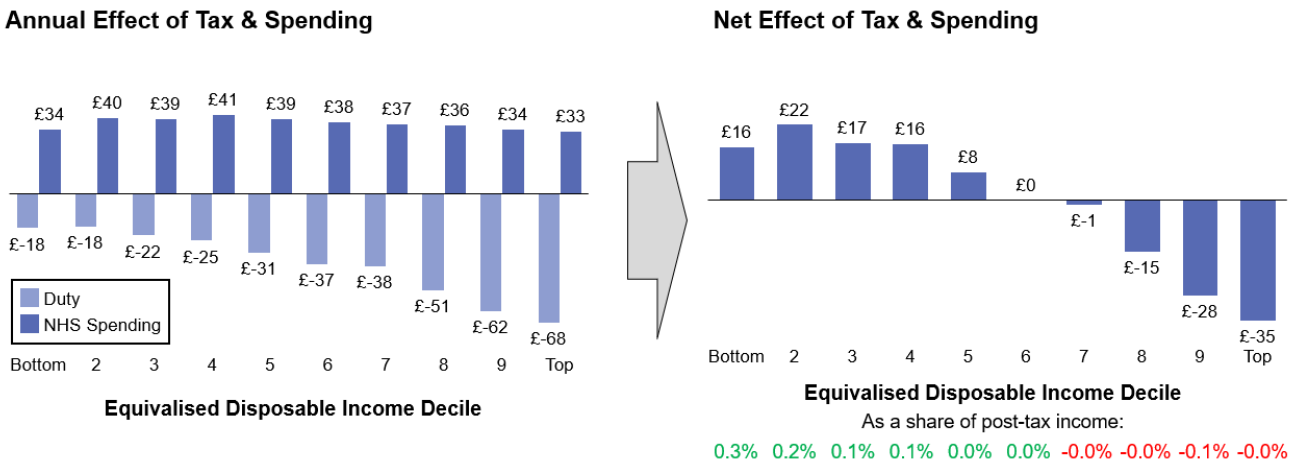
Unfortunately, there is little consistent evidence on how the price elasticity of demand for alcohol varies between richer and poorer households. In an analysis of Australian drinkers, Jiang et al produce the intuitive findings that lower income drinkers are more price sensitive [42]. In the UK context, by contrast, Holmes et al find no systematic difference between richer and poorer consumers: certain products are more price elastic for those with higher incomes, others for those on lower incomes [43]. However, it is important to note that Holmes et al's elasticities are based off a relatively small sample, and consequently many of the estimates are not statistically significant

8 Though of course, insofar as taxes discourage people from consuming a product that they enjoy, this lost enjoyment ought to be seen as a (non-financial) cost. See [41] for further discussion of this point.

[43]. While it is plausible, then, that poorer drinkers are more price sensitive and therefore face less of a financial impact from a duty increase, we cannot be certain this is the case.

The second thing to remember is that alcohol duty does not exist in a vacuum, but comprises part of a wider system of tax and government spending. The net distributional impact of alcohol tax therefore depends not only on the direct effects of the tax itself, but also how the government chooses to use the revenue it generates. Clearly, if the money from alcohol duty is used to fund a reduction in the rate of income tax on high earners, the effects will be regressive. If, by contrast, it is used to fund spending or tax cuts that favour the poor, the effects will be progressive. For illustration, figure 24 shows the effect of an increase in alcohol duty that raises revenue by 10% from all income groups.[9] This additional revenue is then assumed to be spent on the NHS, with all groups benefiting in proportion to the share of public healthcare spending they currently benefit from. The underlying data comes from the ONS' estimates of the effects of tax and benefits on different income groups [44]. Note that since this allocates households to income deciles on the basis of their reported income in the LCFS, it is likely to overstate the initial regressivity of alcohol duty.

*Figure 24: Estimated effect of a 10% increase in alcohol duty revenue, invested in the NHS – 2017/18*

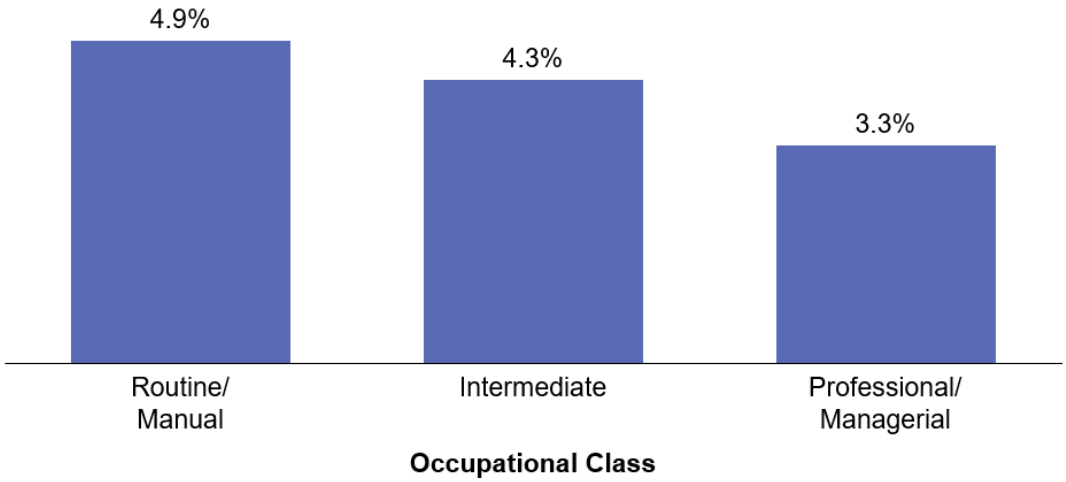



Nevertheless, this analysis shows that once the effects of NHS spending are taken into account, the net impact of the policy is clearly progressive. Overall, households in the bottom 60% of the income distribution are better-off, while those in the top 40% of the income distribution are worse-off. The effects of the policy are relatively small – despite a relatively large increase in alcohol taxes, no income group loses more than 0.1% of its pre-tax income on average.

The third point to keep in mind in considering the impact of alcohol tax on inequality is that poorer groups see more of the health benefits. For reasons that are not fully understood, but may include different patterns of drinking and interactions between alcohol and other risk factors, poorer groups suffer greater alcohol-related harms, despite drinking less on average [45]. This means that an increase in alcohol duty would be expected to save proportionately more lives among the economically disadvantaged. For example, Meier et al modelled the impact of a 13.4% increase in alcohol tax on different occupational groups, and found that it would lead to a 4.9% reduction in deaths from alcohol among routine/manual workers, compared to a 4.3% reduction among intermediate workers and a 3.3% reduction among professional/managerial workers (figure 25).

9 That is, assuming no difference in price elasticity

*Figure 25: Proportion of alcohol-attributable deaths averted from a 13.4% alcohol tax increase in England – 2014/15 [46]*




## Conclusion

Overall, we find that UK alcohol duties are at worst mildly regressive. In light of the evidence that reported income is an unreliable measure of how well-off a household is, we have looked at the relationship between spending on alcohol duty and a range of characteristics: total household expenditure; occupational class; housing size and tenure; and car ownership. Some of these suggest the overall burden of alcohol duty is flat. Other indicators suggest that the very poorest households pay slightly more and very richest households slightly less as a share of their resources, but still that most groups proportionately similar amounts of alcohol duty.

However, this picture varies between different alcoholic products. Wine duty does clearly appear to be progressive, with richer households paying a proportionately greater share. By contrast, poorer households do seem to pay proportionately more beer, cider and particularly spirits duty.

In any case, when evaluating the impact of particular alcohol tax policies on inequality, we would caution against just looking at the current share of income or expenditure spent on alcohol duty. There are three additional factors which may well mitigate any regressive impact of an increase in alcohol duty. First, poorer households may be more price sensitive, in which case they will cut back spending by more in response to an increase in alcohol tax. Second, the revenue from alcohol taxes may be used to fund spending or tax cuts that favour the poor. Third, the poor would be expected to see greater health benefits from the reductions in drinking that would follow an increase in alcohol tax.

# Part 2: How does alcohol tax affect different genders, age groups and regions?

As we have outlined, previous research into the distributional effects of alcohol tax has generally focused on differences between more or less economically advantaged groups. In this report, we attempt to broaden this analysis by exploring how different genders, age groups and regions are affected by duty.

## Methods

For the analysis by region, we took the estimates of alcohol duty as a share of income and expenditure developed from the LCFS in part 1 and averaged these across the different UK regions.

For the analysis by gender and age, however, we cannot use the LCFS because it collects data at the household level, and households often contain both men and women, and people of different age groups. Instead, we turn to NHS Digital's Health Survey for England (HSE), which interviews a random sample of individuals in England each year regarding a range of issues to do with their health, including alcohol consumption [47-49].

Overall, the HSE is believed to have better coverage of alcohol purchases than the LCFS [50], although it appears to under-record spirits and cider consumption relative to beer and wine.[10] However, the HSE also has a couple of major limitations. As the name suggests, it covers only England, rather than the whole of the UK. Moreover, the HSE does not have very reliable or granular income data on many of its respondents, nor any data on spending or other economic characteristics, unlike the LCFS. This means that we will generally have to express our estimates of alcohol duty in absolute terms, rather than as a proportion of income or expenditure.

In our analysis, we used pooled data from the 2015, 2016 and 2017 waves of the HSE. To calculate the amount of alcohol duty paid by each individual in the survey, we first estimated the volume of each type of alcohol that they consume each week. As with the LCFS, we used a standard set of assumptions about serving sizes and product strengths, set out in appendices A and B. We then calculated the duty chargeable on this consumption, using the duty rates that applied at the time of the survey. Note that only the 2016 HSE asked about cider, so our numbers on cider sales come only from the one year of the survey.

Since the government publishes official administrative data on the amount of revenue it brings in from beer, cider, wine and spirits duty [38], we made sure that our estimates match these totals. For example, to estimate the amount of beer duty paid by women, we took the government's average annual recorded beer duty revenue between 2015 and 2017, and multiplied this by the proportion of beer duty paid by women in our HSE estimate. These estimates by beverage type were then summed to estimate the total amount of duty paid by each group.

10 In the 2016 survey, spirits account for 12% of total units of alcohol consumed, and cider for 4%. By contrast, more reliable sales figures indicate that 24% of the alcohol sold in England and Wales comes from spirits and 10% from cider and perry [51].

## Results

### *Alcohol duty and gender*

Overall, we found that women pay around two fifths (39%) of all alcohol duty in the UK (figure 26). This amounts to £160 per head each year for women, compared to £250 per head for men (figure 27) – 36% less on average.

*Figure 26: Share of total UK alcohol duty paid by gender, 2015-17*

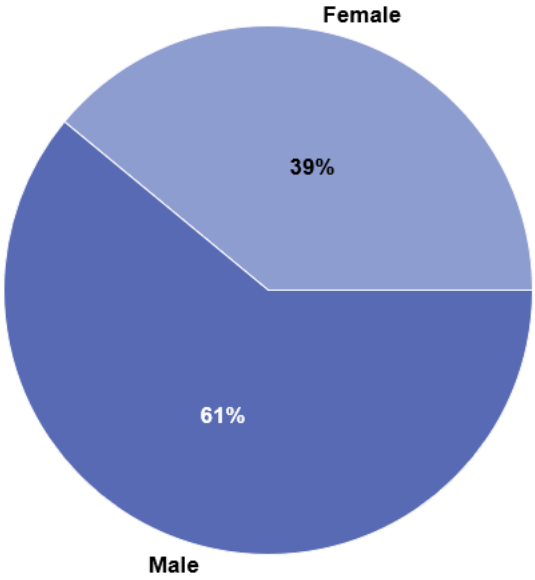



*Figure 27: Annual average UK alcohol duty per capita by gender, 2015-17*

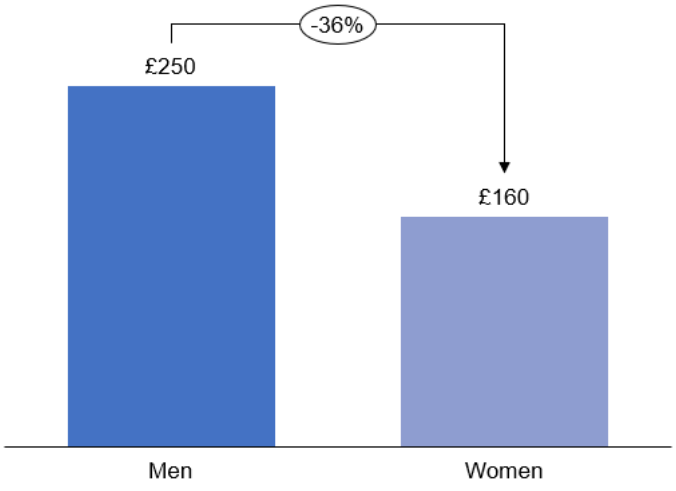
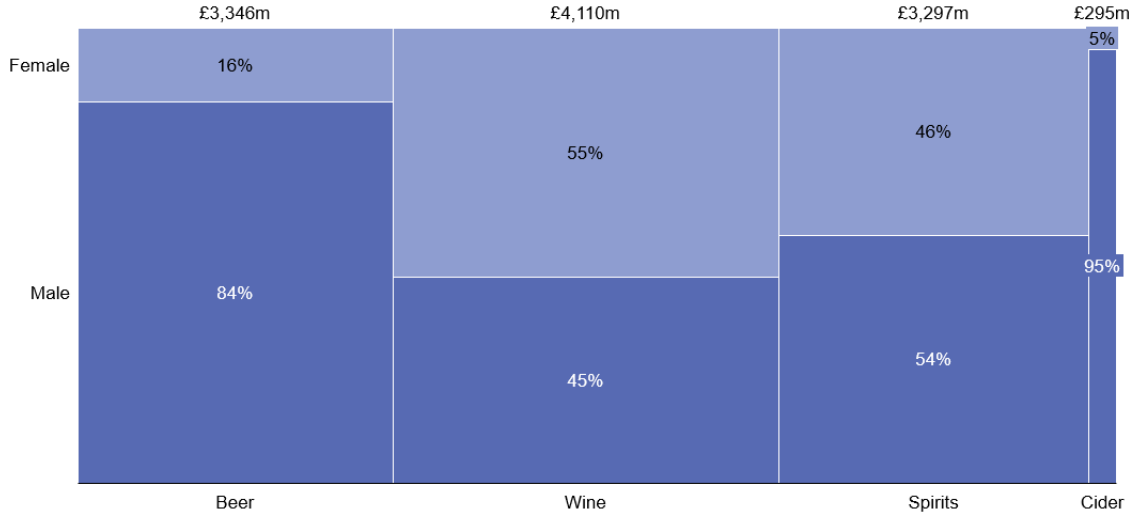



Figure 28 breaks this down by beverage type. It shows that women in fact pay the majority of wine duty – 55% – but relatively little beer or cider duty. This suggests that the government's decision to cut taxes on particular drinks and not others has distributional implications between the genders. It is striking that in the past six years, duty on beer, which overwhelmingly falls on men, has fallen by 18% in real terms. By contrast, wine duty has been cut by 2% over that period [52].

*Figure 28: Share of UK alcohol duty by gender and beverage type, 2015-17 (£m/year)*




It is important to note that this sort of gender-based analysis requires us to look at individuals, rather than households. In some cases, this may be justified, but in others it may provide a misleading picture. Consider a couple where the man drinks only beer and the woman drinks only wine. Is it accurate to say that the woman is unaffected by an increase in beer prices, as our analysis here would suggest? If the pair have completely separate finances, that may be justified. However, if their finances are completely shared, then it is incorrect – the woman is almost as much affected by the fact that the couple are paying more for beer, even if she is not drinking it herself. Nevertheless, these results suggest that it may be useful to consider the gender impact of different alcohol taxes in the future.

## *Alcohol duty and age*

We also looked at how different alcohol duties affect different age groups. Figure 29 shows that middle aged people (45-64 year olds) pay slightly more alcohol duty on average. For example, 55-64 year olds account for 14% of the adult population, but pay 19% of alcohol duty. By contrast, 16-34 year olds account for 30% of the population, but pay 26% of all duty. Of course, this does not account for their ability to pay – since older people are likely to be richer, alcohol duty may still account for a lower share of their income or expenditure than for younger people.

*Figure 29: Share of UK alcohol duty by age group, 2015-17*

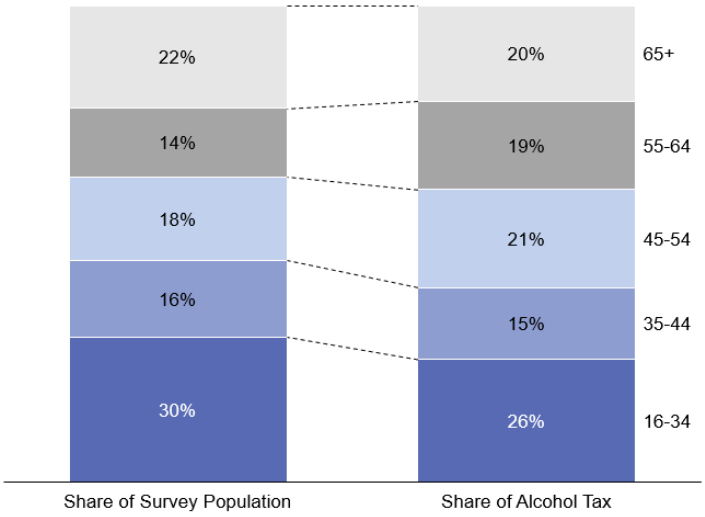
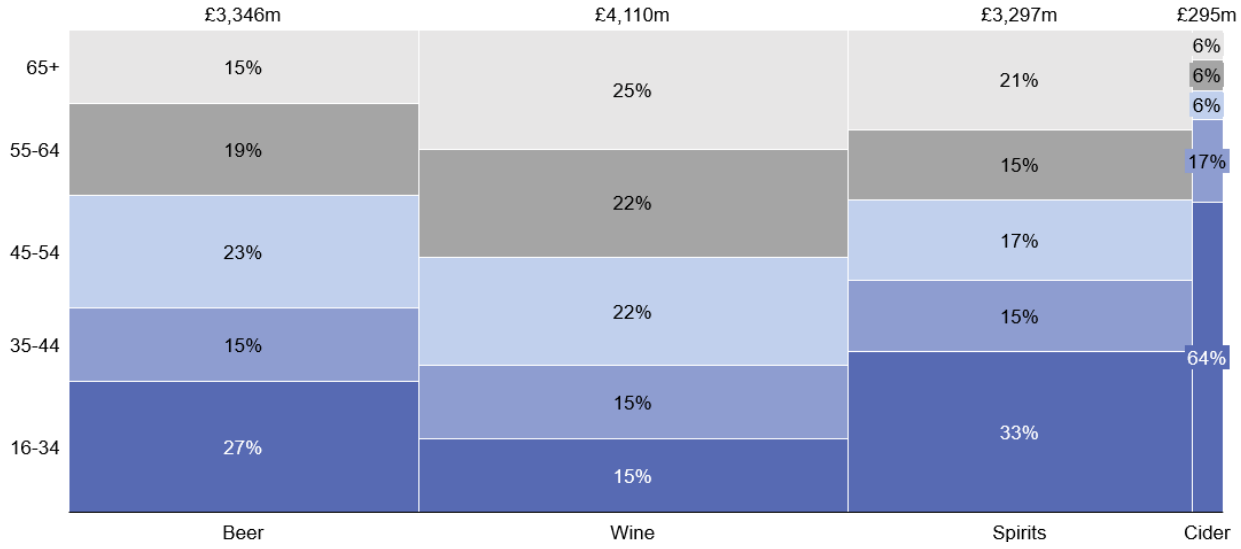


Figure 30 then breaks this down by beverage type, and once again displays quite different patterns for different drinks. It shows that people under 45 pay 81% of cider duty, but just 31% of wine duty. In general, it shows that alcohol duty can be ranked from cider, through spirits and beer, to wine in terms of its relative impact on younger people (and the reverse for older people).

*Figure 30: Share of UK alcohol duty by age group and beverage type, 2015-17 (£m)*




## Alcohol duty and region

Finally, we looked at how the amount of alcohol duty paid varies between different parts of the country. The results are shown in figure 31.

*Figure 31: Alcohol duty as a share of income/expenditure by UK region*

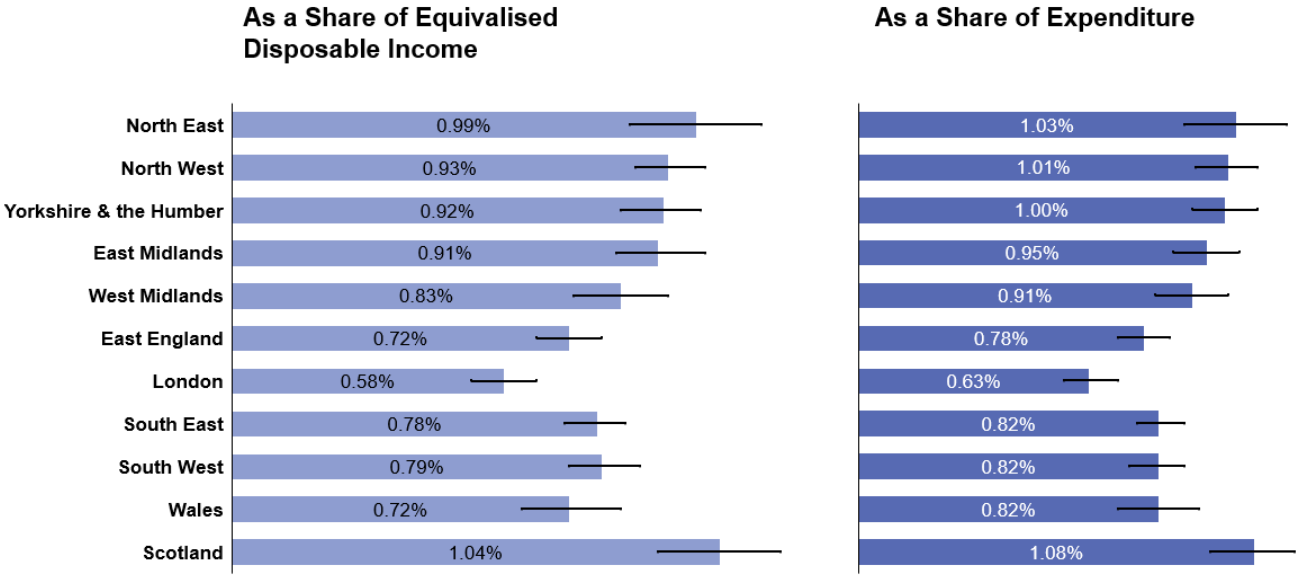



Figure 31 shows that Londoners pay proportionately the lowest alcohol duty – unsurprisingly, since London is both the lowest drinking and richest region of the country. In general, alcohol duty appears to account for a greater share of incomes and budgets in the North and Scotland than the rest of the country, though the difference is not always large enough to be statistically significant.

Figures 32 and 33 break down alcohol duty payments across the different regions into different beverage types. Again there are substantial variations. People in the North East of England pay clearly the highest share of their income and budgets on beer duty. In general, households in the North and Midlands pay proportionately more beer duty. By contrast, Scots pay proportionately the most spirits duty, although again it accounts for a lower share of incomes and budgets in the South of England. Wine duty has a similar financial impact across all the regions.

*Figure 32: Alcohol duty as a share of equivalised disposable income by region*

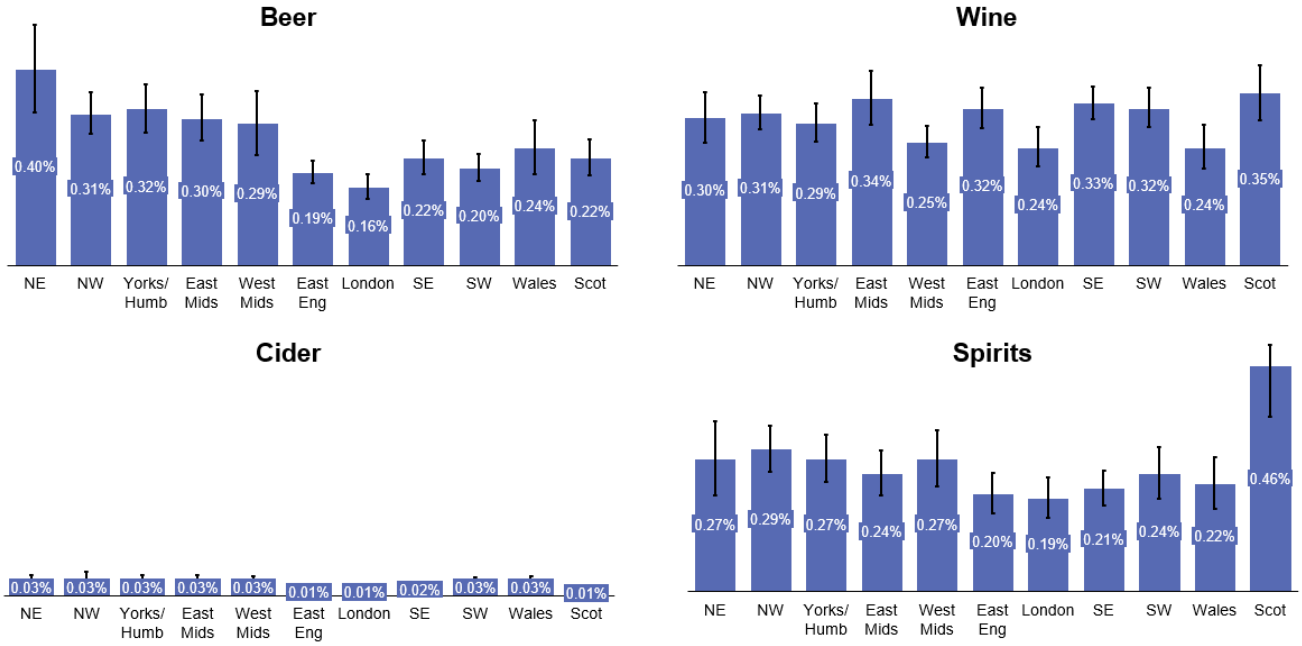
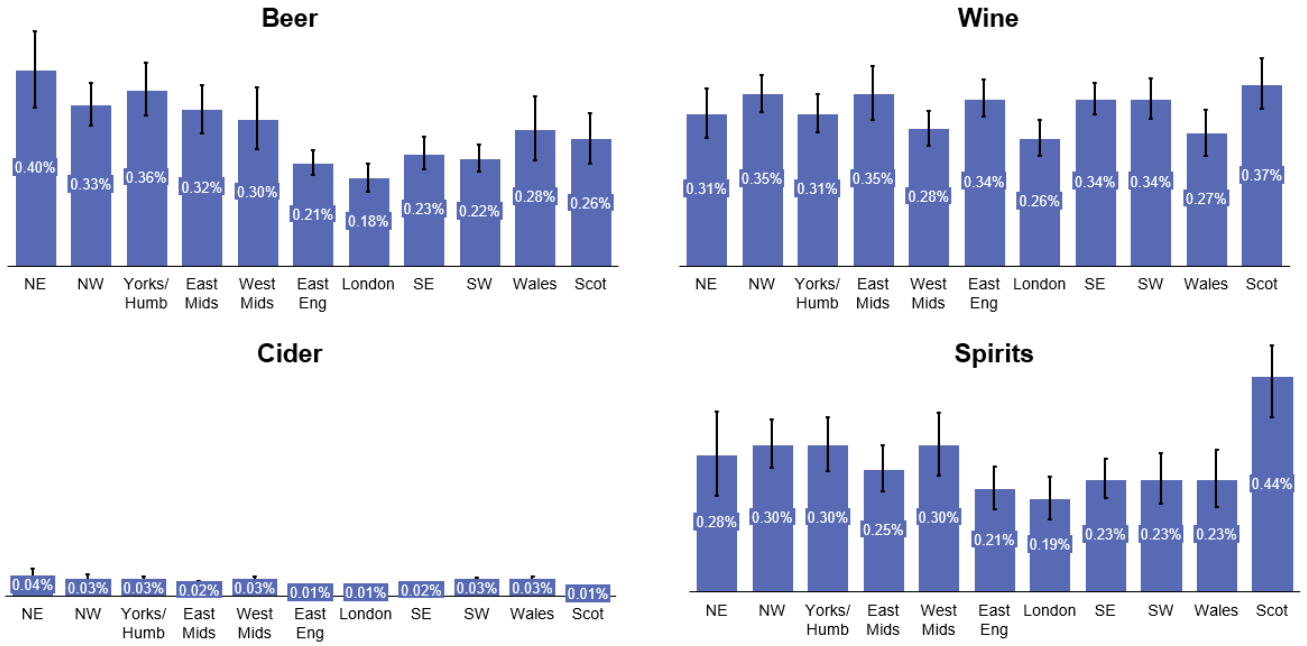



*Figure 33: Alcohol duty as a share of expenditure by region*



# Conclusion

This report has gathered the best available evidence and explored the distributional impact of alcohol taxes in the UK. For the most part, it has focused on the question of whether alcohol tax exacerbates economic inequality, by placing a disproportionate burden on poorer households. We have found limited evidence to support that claim. In general, poorer people drink less than richer people. However, they pay a similar share of their incomes and budgets on alcohol duty – at worst, only slightly more. But any potentially regressive effect of an increase in alcohol tax may be offset if poorer households are more price sensitive, if the tax revenue is used by the government in a way that benefits the poor or if the poor see greater health benefits from lower drinking. Overall, there is little reason for the government to avoid increasing alcohol taxes out of concern for the poor.

We have also taken preliminary steps to look at how alcohol tax affects different genders, age groups and regions. We have shown that men, the middle aged and those in the North and Scotland appear to pay more in alcohol tax. Moreover, the choice of which beverages to tax may have significant distributional consequences. In particular, raising wine duty appears to be progressive. It will also have a relatively greater impact on women, middle aged drinkers, and affect all regions of the country equally.

As with any fiscal measure, it is important to understand the distributional consequences of alcohol taxes. Yet for all the speculation and assumptions made about the impact of UK alcohol duty on different groups, the question has received little empirical attention until now. Based on the evidence we present here, we find concern for inequalities offers little reason to avoid increasing alcohol duty.

# References

[1] Burton R, Henn C, Lavoie D, O'Connor R, Perkins C, Sweeney K. *The Public Health burden of Alcohol and the Effectiveness and Cost-Effectiveness of Alcohol Control Policies: An evidence review*. Public Health England. 2016.

[2] World Health Organization, *Global Action Plan for the prevention and control of noncommunicable diseases 2013-2020*. 2013.

[3] Sassi F, Belloni A, Capobianca C, *The Role of Fiscal Policies in Health Promotion*, OECD Health Working Papers: 66. 2013.

[4] Angus C, Henney M. *Modelling the impact of alcohol duty policies since 2012 in England & Scotland*. Sheffield Alcohol Research Group. 2019.

[5] Economist. "Sin" taxes—eg, on tobacco—are less efficient than they look. Economist [Internet]. 2018 Jul 28 [cited 2020 Jan 17]. Available from: https://www.economist.com/international/2018/07/28/sin-taxes-eg-on-tobacco-are-less-efficient-than-they-look

[6] Kiely M. Lifting alcohol duty freeze would be 'regressive'. The Spirits Business [Internet]. 2018 Jul 4 [cited 2020 Jan 17]. Available from: https://www.thespiritsbusiness.com/2018/07/lifting-alcohol-duty-freeze-would-be-regressive/

[7] Ramanauskas B. Raising fuel and beer duty would be completely counter=productive. Capx [Internet]. 2018 Jul 3 [cited 2020 Jan 17]. Available from: https://capx.co/raising-fuel-and-beer-duty-would-be-completely-counter-productive/

[8] Palin A. UK wine tax to top £4bn for the first time. FT [Internet]. 2016 Mar 3 [cited 2020 Jan 17]. Available from: https://www.ft.com/content/fb7fb7f4-dc96-11e5-8541-00fb33bdf038

[9] Hansard. H.C. Vol. 630, col. 336WH (31 Oct 2017). Available from: https://hansard.parliament.uk/Commons/2017-10-31/debates/D376BC4C-DDAA-47F5-892A-2A4A475E5E0F/TaxationBeerAndPubs

[10] De Henau J, Neitzert E. T*he impact on women of the 2016 Budget: Women paying for the Chancellor's tax cuts*. Women's Budget Group. 2016.

[11] De Henau J, Reis S, Stephenson M-A, Williams E. *A 'jam tomorrow' budget: Women's Budget Group response to the Autumn Budget 2018*. Women's Budget Group. 2018.

[12] Women's Budget Group. Tell the new Prime Minister: tax cuts turn back the clock on gender equality. Women's Budget Group Blog. 2019. Available from: https://wbg.org.uk/blog/tell-the-new-prime-minister-tax-cuts-turn-back-the-clock-on-gender-equality/

[13] E.W. What is gender budgeting? Economist [Internet] 2017 Mar 3 [cited 2020 Jan 17]. Available from: https://www.economist.com/the-economist-explains/2017/03/03/what-is-gender-budgeting

[14] Gardiner L. *A Budget for Intergenerational Fairness*. Resolution Foundation Intergenerational Commission Briefing. 2017.

[15] Giles C. Sajid Javid sets March 11 date for Budget to 'level up' UK regions. FT [Internet]. 2020 Jan 7 [cited 2020 Jan 17]. Available from: https://www.ft.com/content/27daa4ee-3099-11ea-a329-0bcf87a328f2

[16] Snowdon C. *Aggressively Regressive*. IEA Current Controversies Paper No. 47. 2013.

[17] Snowdon C. *Of Course Sin Taxes are Regressive*. IEA Current Controversies Paper No. 63. 2018.

[18] Vandenberg B, Sharma A. Are Alcohol Taxation and Pricing Policies Regressive? Product-Level Effects of a Specific Tax and a Minimum Unit Price for Alcohol. *Alcohol and Alcoholism*; 51(4): 483-502. 2016.

[19] Naimi TS, Daley JI, Xuan Z, Blanchette JG, Chaloupka FJ, Jernigan DH. Who Would Pay for State Alcohol Tax Increases in the United States? *Preventing Chronic Disease: Public Health Research, Practice and Policy*; 13(E7). 2016.

[20] Ataguba JE. Alcohol Policy and Taxation in South Africa: An Examination of the Economic Burden of Alcohol Tax. *Applied Health Economics and Health Policy*; 10(1): 66-76. 2012.

[21] Ashton T, Casswell S, Gilmore L. Alcohol taxes: do the poor pay more than the rich? *British Journal of Addiction*; 84(7):759-766. 1989.

[22] Sassi F, Belloni A, Mirelman AJ, Suhrcke M, Thomas A, Salti N et al. Equity impacts of price policies to promote health behaviours. *Lancet*; 391 (10134): 2059-70. 2018.

[23] John E. Adult drinking habits in Great Britain: 2017. Office for National Statistics. 2018.

[24] NHS Digital. Health Survey for England 2018: Data tables. Available from: https://digital.nhs.uk/data-and-information/publications/statistical/health-survey-for-england/2018/health-survey-for-england-2018-data-tables

[25] Cheong CK, Dean L, Dougall I, Hinchcliffe S, Mirani K, Vosnaki K et al. The Scottish Health Survey 2018. Scottish Government.

[26] Levell P, O'Connell M, Smith K. Excise duties. In: Emmerson C, Johnson P, Joyce R (eds.) *The IFS Green Budget*. London: Institute for Fiscal Studies; 2016, p.201-32.

[27] Williams T. Detailed household expenditure as a percentage of total expenditure by disposable income decile group: Table 3.2. Office for National Statistics. Available from: https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/expenditure/datase/ldexpenditureasapercentageoftotalexpenditurebydisposableincomedecilegroupuktable32e

[28] Lyon AB, Schwab RM. Consumption Taxes in a Life-Cycle Framework: Are Sin Taxes Regressive? *The Review of Economics and Statistics*; 77(3): 389-406.

[29] Brewer M, O'Dea C. *Measuring living standards with income and consumption: Evidence from the UK*. ISER Working Paper Series No. 2012-05. 2012.

[30] Corlett A. No, the poorest don't pay higher taxes than the richest. [Internet] 2018 Jun 20 [cited 2020 Jan 17]. Available from: https://www.resolutionfoundation.org/comment/no-the-poorest-dont-pay-higher-taxes-than-the-richest/

[31] Brewer M, Etheridge B, O'Dea C. Why are households that report the lowest incomes so well-off? *The Economic Journal* 127 (Oct): F24-F49. 2017.

[32] Brzozowski M, Crossley TF. Measuring the well-being of the poor with income or consumption: a Canadian perspective. *Canadian Journal of Economics*; 44(1): 88-106. 2011.

[33] Bozio A, Emmerson C, O'Dea C, Tetlow G. Do the rich save more? Evidence from linked survey and administrative data. *Oxford Economics*; 69(4): 1101-19. 2017.

[34] Crawford R. *The use of wealth in retirement*. IFS Briefing Note BN237. 2018.

[35] Bhattacharya A. *Splitting the Bill: Alcohol's Impact on the Economy*. Institute of Alcohol Studies. 2017.

[36] Department for Environment, Food and Rural Affairs, Office for National Statistics. Living Costs and Food Survey, 2006-2017: Secure Access [data collection]. 12th Edition. UK Data Service. SN: 7047, http:??doi.org/10/5255/UKDA-SN-7047-12. 2019.

[37] Bulman J, Davies R, Carrel O. Living Costs and Food Survey Technical Report for survey year: April 2015 to March 2016 Great Britain and Northern Ireland. Office for National Statistics. 2017.

[38] HM Revenue and Customs. UK Alcohol Duty Statistics Tables (October 2019). [Internet] 2019 Nov 29 [cited 2020 Jan 22]. Available from: https://www.gov.uk/government/statistics/alcohol-bulletin

[39] Howley E. UK National Accounts, The Blue Book. Office for National Statistics. 2019.

[40] Ally AK, Meng Y, Chakraborty E, Dobson PW, Seaton JS, Holmes J et al. Alcohol tax pass-through acrss the product and price range: do retailers treat cheap alcohol differently? Addiction; 109(12): 1994-2002.

[41] Bhattacharya A. Dereliction of duty: Are UK alcohol taxes too low? Institute of Alcohol Studies. 2016.

[42] Jiang H. Price elasticity of on- and off-premises demand for alcoholic drinks: A Tobit analysis, Drug and Alcohol Dependence 163: 222-8. 2016.

[43] Holmes J, Meng Y, Meier PS, Brennan A, Angus C, Campbell-Burton A et al. Effects of minimum unit pricing for alcohol on different income and socioeconomic groups: a modelling study. Lancet 383(9929): p1655-64. 2014.

[44] Webber D, O'Neill J. Effects of taxes and benefits on household income: historical household-level datasets. Office for National Statistics. 2019.

[45] Smith K, Foster J. Alcohol, Health Inequalities and the Harm Paradox: Why some groups face greater problems despite consuming less alcohol. Institute of Alcohol Studies. 2014.

[46] Meier PS, Holmes J, Angus C, Ally AK, Meng Y, Brennan A. Estimated Effects of Different Alcohol Taxation and Price Policies on Health Inequalities: A Mathematical Modelling Study. *PLoS Medicine* 13(2): e1001963. 2016.

[47] NHS Digital, *Health Survey for England, 2015* [data collection]. UK Data Service. SN: 8280 doi: 10.5255/UKDA-SN-8280-2

[48] NHS Digital, *Health Survey for England, 2016* [data collection]. UK Data Service. SN: 8334 doi: 10.5255/UKDA-SN-8334-3

[49] NHS Digital, *Health Survey for England, 2017* [data collection]. UK Data Service. SN: 8488 doi: 10.5255/UKDA-SN-8488-2

[50] Bhattacharya A, Angus C, Pryce R, Holmes J, Brennan A, Meier PS. How dependent is the alcohol industry on heavy drinking in England? *Addiction* 113(12): p2225-32. 2018.

[51] NHS Health Scotland. MESAS monitoring report 2019 – alcohol sales. NHS Health Scotland. 2019

[52] Institute of Alcohol Studies. Budget 2018 analysis. Institute of Alcohol Studies. 2018.

# Appendix A: Assumed container sizes where not explicitly captured

## LCFS

| Drink | Assumed volume |
|---|---|
| Bottle of beer | 330ml |
| Bottle of cider | 500ml |
| Can of cider/beer | 440ml |
| Unspecified beer/cider | Pint (568ml) |
| Small glass wine/champagne | 125ml |
| Medium glass wine/champagne | 175ml |
| Large glass wine/champagne | 250ml |
| Unspecified wine/champagne | 175ml |
| Half bottle (fortified) wine/champagne | 375ml |
| Bottle (fortified) wine/champagne | 750ml |
| Small/medium/unspecified glass fortified wine | 50ml |
| Large glass fortified wine | 70ml |
| Single Spirits/Liquers | 25ml |
| Double Spirits/Liquers | 50ml |
| Bottle Spirits/Liquers | 700ml |
| Bottle alcopop | 275ml |

## HSE

| Drink | Assumed volume |
|---|---|
| Small can beer/cider | 330ml |
| Large can beer/cider | 440ml |
| Bottle of beer | 330ml |
| Bottle of cider | 500ml |
| Can of cider/beer | 440ml |
| Small glass wine | 125ml |
| Unspecified glass wine | 175ml |
| Large glass wine | 250ml |
| Bottle wine | 750ml |
| Sherry | 50ml |
| Single Spirits | 25ml |
| Double Spirits/Liquers | 50ml |
| Small can alcopop | 250ml |

# Appendix B: Assumed ABVs by product

## LCFS

| Product | On-trade ABV | Off-trade ABV |
|---|---|---|
| Beer | 4.4% | 4.7% |
| Spirits | 36.8% | 37.1% |
| Alcopops | 4.5% | 4.5% |

## HSE

| Product | ABV |
|---|---|
| Normal Beer | 4.4% |
| Strong | 7.5% |
| Spirits | 37% |
| Alcopops | 4.5% |

# Appendix C: Additional analyses

## Table 1: Alcohol duty as a share of income by housing tenure (standard error in brackets)

| Class | Beer | Cider | Wine | Spirits |
|---|---|---|---|---|
| Social Housing | 0.33% (0.026%) | 0.04% (0.007%) | 0.19% (0.018%) | 0.32% (0.031%) |
| Private rental | 0.25% (0.015%) | 0.02% (0.003%) | 0.21% (0.013%) | 0.22% (0.017%) |
| Owned/Rent free | 0.23% (0.006%) | 0.02% (0.001%) | 0.35% (0.008%) | 0.26% (0.009%) |

## Table 2: Alcohol duty as a share of spending by housing tenure (standard error in brackets)

| Class | Beer | Cider | Wine | Spirits |
|---|---|---|---|---|
| Social Housing | 0.35% (0.028%) | 0.04% (0.006%) | 0.19% (0.016%) | 0.32% (0.028%) |
| Private rental | 0.24% (0.013%) | 0.02% (0.002%) | 0.20% (0.011%) | 0.21% (0.016%) |
| Owned/Rent free | 0.26% (0.007%) | 0.02% (0.001%) | 0.39% (0.008%) | 0.28% (0.010%) |

## Table 3: Alcohol duty as a share of income by number of rooms in house (standard error in brackets

| Number of Rooms | Beer | Cider | Wine | Spirits |
|---|---|---|---|---|
| 3 or fewer | 0.33% (0.037%) | 0.05% (0.014%) | 0.24% (0.024%) | 0.38% (0.058%) |
| 4 | 0.25% (0.019%) | 0.02% (0.004%) | 0.26% (0.018%) | 0.27% (0.020%) |
| 5 | 0.25% (0.011%) | 0.02% (0.002%) | 0.26% (0.012%) | 0.25% (0.015%) |
| 6 | 0.26% (0.013%) | 0.02% (0.001%) | 0.31% (0.013%) | 0.27% (0.017%) |
| 7 | 0.25% (0.019%) | 0.01% (0.002%) | 0.33% (0.015%) | 0.24% (0.019%) |
| 8+ | 0.19% (0.009%) | 0.01% (0.002%) | 0.41% (0.018%) | 0.21% (0.016%) |

## Table 4: Alcohol duty as a share of expenditure by number of rooms in house (standard error in brackets)

| Number of Rooms | Beer | Cider | Wine | Spirits |
|---|---|---|---|---|
| 3 or fewer | 0.36% (0.044%) | 0.04% (0.011%) | 0.26% (0.023%) | 0.38% (0.050%) |
| 4 | 0.26% (0.018%) | 0.02% (0.003%) | 0.27% (0.017%) | 0.28% (0.021%) |
| 5 | 0.28% (0.013%) | 0.02% (0.002%) | 0.28% (0.011%) | 0.26% (0.015%) |
| 6 | 0.29% (0.014%) | 0.02% (0.001%) | 0.33% (0.013%) | 0.28% (0.018%) |
| 7 | 0.27% (0.018%) | 0.02% (0.002%) | 0.37% (0.016%) | 0.26% (0.019%) |
| 8+ | 0.20% (0.008%) | 0.01% (0.001%) | 0.44% (0.017%) | 0.21% (0.015%) |

## Table 5: Alcohol duty as a share of income by number of cars (standard error in brackets)

| Number of Cars/ Vans | Beer | Cider | Wine | Spirits |
|---|---|---|---|---|
| 0 | 0.29% (0.020%) | 0.03% (0.006%) | 0.22% (0.016%) | 0.32% (0.026%) |
| 1 | 0.25% (0.009%) | 0.02% (0.001%) | 0.31% (0.009%) | 0.26% (0.011%) |
| 2 | 0.22% (0.008%) | 0.01% (0.001%) | 0.35% (0.012%) | 0.21% (0.010%) |
| 3 | 0.20% (0.016%) | 0.02% (0.002%) | 0.33% (0.030%) | 0.20% (0.022%) |
| 4+ | 0.32% (0.042%) | 0.02% (0.004%) | 0.33% (0.047%) | 0.23% (0.044%) |

## Table 6: Alcohol duty as a share of expenditure by number of cars (standard error in brackets)

| Number of Cars/ Vans | Beer | Cider | Wine | Spirits |
|---|---|---|---|---|
| 0 | 0.31% (0.022%) | 0.03% (0.004%) | 0.23% (0.014%) | 0.35% (0.025%) |
| 1 | 0.26% (0.009%) | 0.02% (0.001%) | 0.33% (0.009%) | 0.27% (0.011%) |
| 2 | 0.25% (0.009%) | 0.01% (0.001%) | 0.39% (0.012%) | 0.22% (0.011%) |
| 3 | 0.23% (0.016%) | 0.02% (0.003%) | 0.37% (0.032%) | 0.22% (0.022%) |
| 4+ | 0.33% (0.038%) | 0.03% (0.005%) | 0.40% (0.062%) | 0.23% (0.042%) |

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