



Modelling the potential impact of duty policies using the Sheffield Alcohol Policy Model Version 3

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Erratum

This report has been amended to correct a reporting error which meant that cumulative 5 year figures presented for deaths, hospital admissions, NHS costs and QALYs were in fact the cumulative changes over 6 years. As a result, these figures were overstated by approximately 20%. The relevant numbers in Tables 3.3, 3.4, 3.9 and 3.11 have now been amended, as have the corresponding Figures 3.6, 3.7, 3.44 and 3.13 and related figures in the first paragraph on page 24. All other figures in the report are unaffected.

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1 INTRODUCTION

In 2014 the Sheffield Alcohol Research Group (SARG) were commissioned by Public Health England (PHE) to appraise the potential impact of a range of Minimum Unit Pricing and Identification and Brief Advice policies in England (1). This work utilised the latest version of the Sheffield Alcohol Policy Model (SAPM3).

The present report builds on this work by appraising the potential impact of a range of future duty policies in England, specifically:

1. A 5 year duty escalator of 2% above inflation, whereby all alcohol duties are raised by 2% each year above the level of inflation
2. A 5 year duty freeze, whereby all alcohol duties are held at current levels
3. A one-off 2% duty cut followed by a 4 year duty freeze
4. A 5 year duty escalator of 2% above inflation combined with a 60p Minimum Unit Price

These policies were selected as they represent a range of alcohol policy options which have been discussed or implemented in recent years by the UK Government. A 2% above inflation duty escalator was introduced by the then-Chancellor Alistair Darling in 2008. This remained in place until 2013 when it was abolished for beer and duty cut. The escalator on other products was ended in 2014, with beer duty cut further and duty frozen on spirits and cider. In 2015 duty was cut on beer, spirits and cider and frozen on wine.

We also present results for a 60p MUP alone, assuming duty remains constant in real terms (i.e. increases in line with CPI year-on-year), for comparative purposes.

For all policies we estimate the impact on alcohol consumption, spending on alcohol, alcohol-related health, alcohol-related crime, workplace absence and revenue to alcohol retailers and the exchequer.

2 METHODS

2.1 Overview of SAPM3

The Sheffield Alcohol Policy Model is an epidemiological mathematical simulation model which has previously been used to appraise a wide range of alcohol policy interventions, including pricing, availability and Identification and Brief Advice (IBA) programmes both in the UK and internationally (2–6). Full details of the modelling methodology have been described elsewhere (1,7) and full details of the data used in this version of the model can be found in the linked report on IBA and MUP (1). To summarise, SAPM3 consists of two linked models:

1. A population simulation model of the relationship between alcohol policies and alcohol consumption which accounts for the relationship between average weekly alcohol consumption, the patterns in which that alcohol is drunk and how these are distributed within the population, considering age, gender and socioeconomic status

2. A cohort simulation model of the relationship between alcohol consumption and health, crime and workplace outcomes which accounts for patterns of consumption and also the sociodemographic gradients in existing levels of alcohol-related harm

2.2 Modelling changes in duty rates

SAPM3 is the first iteration of the Sheffield Alcohol Policy Model to be able to examine the impact of taxation policies, and the methodology for doing this has not previously been described. The baseline pricing data used in the model comes from the annual Living Costs and Food Survey (LCFS). This data takes the form of transaction-level records detailing the beverage type (beer, cider, wine, spirits or Ready-to-Drinks (RTDs)), purchase location (on- or off-trade), volume of ethanol purchased and total price paid, together with sociodemographic data on the purchaser.

In order to model the impact of duty policies on product prices it is first necessary to estimate the current tax (duty + VAT) levied on each unit of alcohol sold¹. These rates are calculated based on current alcohol duty rates effective from 25th March 2015 (8). As duties for cider and wine are excised by product volume, rather than ethanol content, we assume average strengths (ABVs) of 4.9% and 12.58% respectively. This assumption is guided by market research data obtained from the Nielsen company. For beer, cider and spirits, duty is levied across several bands depending on the ABV of the product. As the LCFS data does not allow us to identify the specific ABV of individual products we apply the most common rate to all products within each category. The impact of this assumption is likely to be minimal as only a very small proportion of products are taxed under the higher or lower strength bandings (e.g. 0.43% of beer sold in England and Wales in 2013 was low strength (9)). The final estimated taxation rates per unit of alcohol are presented in Table 2.1.

Having estimated the duty + VAT per unit for each beverage type, the next step is to model the change in this component under an alternative duty policy. The baseline assumption in the absence of a policy intervention is that alcohol prices will rise in line with the Consumer Price Index (CPI) – that is to say that prices will remain constant in real terms. In order to derive future uplift factors required to calculate absolute duty increases for a 2% duty escalator we apply 2% increases on top of CPI forecasts for the four year period between 2016–2019, obtained from the Office for Budget Responsibility (10). With 2015 as the baseline year, absolute differences in unit prices of beer, cider, wine, spirits and RTDs, for both on- and off-trade, are then calculated by subtracting prices between two consecutive years. These prices are then deflated to 2015 prices. A policy of freezing duty at current levels is modelled similarly, by assuming that future duty rates remain static, then deflating future absolute tax rates per unit to 2015 prices, i.e. reducing future effective duty rates, as positive inflation in 2016-2019 will reduce their value in real terms. The final modelled tax rates are shown in Table 2.2. The combination of a duty escalator and Minimum Unit Price (MUP) policy is modelled by first applying the MUP to the LCFS data, then applying the year 1 duty increase to the revised prices.

¹ Note that we consider only the VAT levied on the duty itself as we are only modelling changes in this component of the overall price of the product

Table 2.1 - Baseline duty rates and assumptions used in the model (based on duty rates from 25th March 2015)

Beverage type	Duty rates as set by HMRC from 25 th March 2015 (£)	Assumed duty rate for SAPM3	Assumed average ABV for wine and cider	Estimated duty in pence per unit of alcohol	Estimated duty plus VAT in pence per unit of alcohol
Beer	8.10 to 23.85 per hectolitre per cent of alcohol in the beer (varies according to ABV: general – 18.37, lower strength – 8.10, higher strength – 23.85)	£18.37 per hectolitre per cent of alcohol in product (general duty rate)	n/a	18.4	22.0
Cider	38.87 to 264.61 per hectolitre of product (still cider – 38.87 to 58.75, sparkling cider – 38.87 to 264.61)	£38.87 per hectolitre of product (still cider with ABV 1.2% to 7.5% and sparkling cider with ABV 1.2% to 5.5%)	4.9%	12.0	14.4
Wine	84.21 to 364.37 per hectolitre of product (wine, still wine and made wine – 84.21 to 364.37, sparkling wine and made wine – 264.61 to 350.07) or 27.66 per litre of pure alcohol (wine with ABV > 22%)	£273.31 per hectolitre of product (still wine with ABV 5.5% to 15%)	12.58%	29.0	34.8
Spirits	27.66 per hectolitre of pure alcohol	£27.66 per hectolitre of pure alcohol	n/a	27.7	33.2
RTDs	27.66 per hectolitre of pure alcohol (spirits based)	£27.66 per hectolitre of pure alcohol (spirits based)	n/a	27.7	33.2

Table 2.2 - Modelled tax rates per unit of alcohol (in pence)

		Baseline (2015)		Revised Duty+VAT (in 2015 prices)				
		Duty	Duty+VAT	Year 1	Year 2	Year 3	Year 4	Year 5
Duty escalator (2% above CPI)	Beer	18.37	22.04	22.75	23.57	24.46	25.38	26.33
	Cider	11.99	14.39	14.85	15.38	15.96	16.57	17.19
	Wine	28.96	34.76	35.86	37.17	38.56	40.02	41.51
	Spirits	27.66	33.19	34.25	35.49	36.83	38.22	39.65
Duty freeze	Beer	18.37	22.04	21.78	21.42	21.02	20.61	20.20
	Cider	11.99	14.39	14.22	13.98	13.72	13.45	13.19
	Wine	28.96	34.76	34.34	33.77	33.14	32.49	31.85
	Spirits	27.66	33.19	32.80	32.25	31.65	31.03	30.42
Duty cut (2%)	Beer	18.37	22.04	21.35	20.74	20.35	19.96	19.56
	Cider	11.99	14.39	13.93	13.54	13.29	13.02	12.77
	Wine	28.96	34.76	33.66	32.70	32.09	31.46	30.85
	Spirits	27.66	33.19	32.14	31.23	30.65	30.05	29.46

2.3 Model outcomes

In line with epidemiological evidence which suggests that the impact of changes in alcohol consumption on health can take up to 20 years to be realised (11), previous policy analyses using SAPM3 have reported outcomes in the 20th year following policy implementation as ‘full effect’ results. In order to estimate the specific impact of a policy within the time frames of a single administration, results are presented here cumulatively over 5 years, as well as in the 20th year following policy implementation. For all analyses beyond 5 years it is assumed that the implemented policies are in place for 5 years, with prices remaining static in real terms (i.e. being increased in line with CPI) in all subsequent years. In all analyses the counterfactual is the assumption that prices remain static in real terms across the full modelled 20 year time horizon.

For all policies, results are presented for the estimated impact on alcohol consumption, spending on alcohol, revenue to the exchequer, revenue to retailers, alcohol-related deaths, alcohol-related hospital admissions (using the narrow measure of alcohol-attribution (12)), Quality-Adjusted Life Years (QALYs), cost savings to the NHS, alcohol-related crimes, alcohol-related workplace absence and overall costs to society. All costs are presented in 2015 prices and all cost and QALY outcomes are discounted at 3.5% in line with NICE guidelines (13).

2.4 Sensitivity analyses

In order to explore the potential impact of alternative assumptions, we present the results for two alternative sensitivity analyses:

1. HMRC have recently published a working paper which contains estimates of price elasticities of demand for alcohol in the UK (14). These estimates are derived using an alternative (cross-sectional tobit) specification to those used in SAPM3 (longitudinal pseudo-panel), although the overall scale of the estimates is generally similar. We test the impact of applying the HMRC elasticities to 4 of the key modelled policies (duty escalator, duty freeze, duty escalator + 60p MUP and 60p MUP).
2. In order to evaluate the impact of the potential delayed implementation of a MUP policy, we considered the impact of introducing a duty escalator, with the addition of a 60p MUP in the 3rd year following implementation (i.e. in 2018).

3 RESULTS

3.1 Impacts on alcohol consumption

Baseline characteristics and modelled policy impacts on alcohol consumption for the overall adult population and separately by drinker group² and socioeconomic classification (SEC)³ in Table 3.1. Figure 3.1 and Figure 3.2 present the relative policy impacts by drinker group and SEC respectively.

² Moderate – those whose usual alcohol intake is no more than 21/14 units per week for men/women (1 unit=8g ethanol).

Increasing risk – those drinkers consuming 21-50/14-35 units per week for men/women

High risk – those drinkers whose usual alcohol intake exceeds 50/35 units per week for men/women

³ Defined using the National Statistics Socioeconomic Classification (NS-SEC):

SEC1 – Managerial or professional occupations

SEC2 – Intermediate occupations

SEC3 – Routine and manual occupations and the unemployed

These results show that the duty-lowering policies lead to modest increases in consumption, while a duty escalator leads to a somewhat greater reduction in drinking. All three duty-modifying policies show only a slight gradient in effect across drinker and SEC groups, with heavier drinkers and those in lower socioeconomic groups experiencing marginally greater reductions in consumption. By comparison, the two modelled policies incorporating a 60p MUP are estimated to lead to notably larger reductions in consumption and with considerably steeper gradients in effect across both drinker and SEC groups. The combination of a duty escalator and a 60p MUP is more effective than the 60p MUP alone, although the impact on moderate drinkers is somewhat greater (a 4.3% reduction in mean consumption vs. 2.3%).

Table 3.1 - Estimated impact of pricing policies on alcohol consumption

	Popula tion	Moderate	Increasing risk	High risk	SEC1 (highest)	SEC2	SEC3 (lowest)
Drinker population (millions)	36.3	27.2	7.0	2.0	14.1	8.9	13.1
Baseline units per year (per drinker)	710	289	1,397	3,998	727	739	671
Change in consumption at full effect (units per year)							
Duty escalator	-18.43	-6.78	-36.18	-113.79	-14.93	-20.19	-20.81
Duty freeze	8.48	3.11	16.62	52.59	6.83	9.29	9.63
Duty cut	11.50	4.22	22.54	71.38	9.25	12.60	13.07
Duty escalator + 60p MUP	-41.87	-12.27	-71.54	-338.09	-18.41	-44.81	-63.73
60p MUP	-27.41	-6.54	-42.20	-257.63	-5.34	-28.97	-48.78

Figure 3.1 - Relative policy impact on consumption by drinker group



Figure 3.2 - Relative policy impact on consumption by SEC



3.2 Impacts on spending on alcohol

Baseline spending on alcohol and modelled policy impacts on annual spending are presented in Table 2.2, with Figure 3.3 and Figure 3.4 showing the relative impacts of each policy. These results show similar patterns to the consumption results, with two notable exceptions:

- 1) Directions of effect are reversed, with consumption-reducing policies leading to increased spending and vice versa. This is due to reductions in consumption being more than offset by increases in the price per unit of the alcohol which is still consumed post-policy.
- 2) The socioeconomic gradient is reversed, with higher SEC groups experiencing greater changes in spending across all modelled policies. This is primarily because higher SEC drinkers pay more per unit on average for their alcohol, both through greater preferences for higher-duty products such as wine, but also due to a greater preference for consumption in the on-trade, where prices are higher in general.

Table 3.2 - Estimated impact of pricing policies on consumer spending

	Popula tion	Moderate	Increasing risk	High risk	SEC1 (highest)	SEC2	SEC3 (lowest)
Drinker population (millions)	36.3	27.2	7.0	2.0	14.1	8.9	13.1
Baseline spend per year (per drinker)	£644	£322	£1,231	£2,933	£675	£641	£611
Change in spending at full effect (£ per year)							
Duty escalator	24.39	9.58	49.91	135.17	30.36	25.41	17.43
Duty freeze	-10.57	-4.12	-21.66	-58.97	-13.15	-11.04	-7.54
Duty cut	-14.26	-5.55	-29.22	-79.59	-17.74	-14.90	-10.17
Duty escalator + 60p MUP	48.88	16.26	104.10	296.66	65.95	54.57	27.47
60p MUP	26.85	7.27	59.35	177.74	38.32	31.87	11.76

Figure 3.3 - Relative policy impacts on spending by drinker group

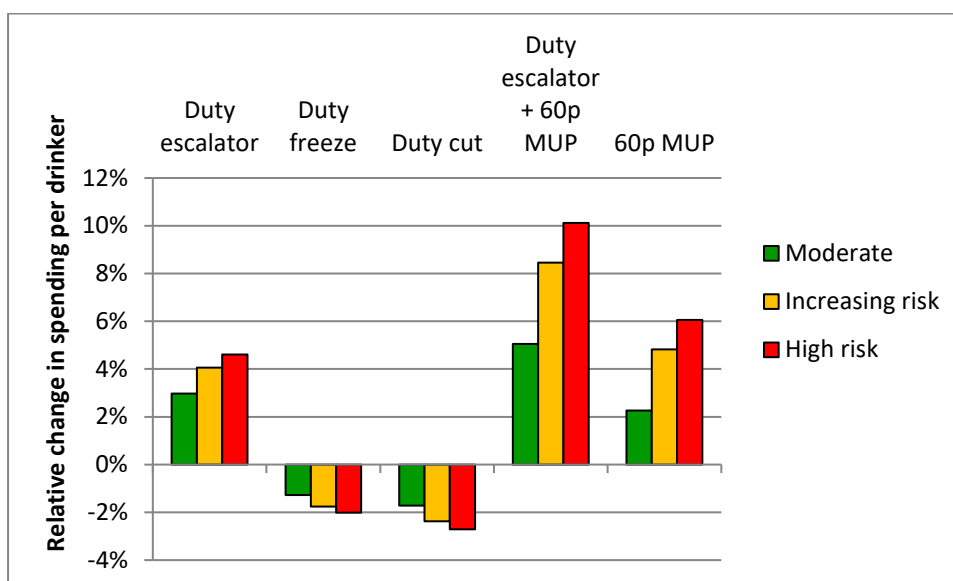
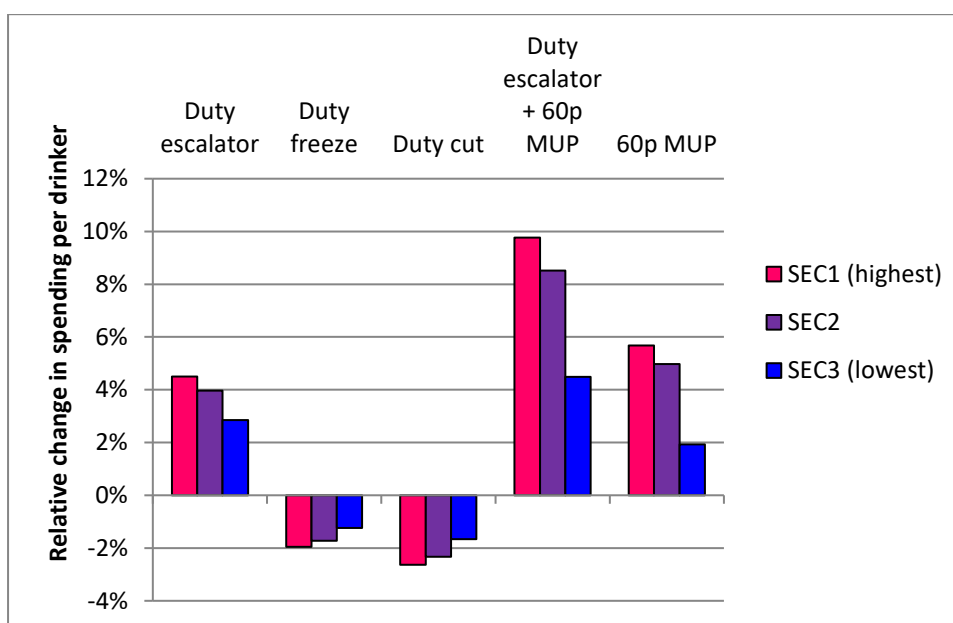


Figure 3.4 - Relative policy impacts on spending by SEC



3.3 Impacts on health outcomes

The estimated impact of each modelled policy on deaths and hospital admissions over the first 5 years, and in year 20 are shown in Table 3.3 and Table 3.4 respectively. Relative changes in deaths and hospital admissions for all policies in year 20 are illustrated in Figure 3.5, while cumulative changes in admissions over the first 5 years following policy implementation, broken down by drinker group and SEC are presented in Figure 3.6 and Figure 3.7. These results show that all price-increasing policies are estimated to lead to substantial reductions in alcohol-related deaths and hospital admissions, while duty reductions would lead to a 2-4% increase over 20 years. For all policies, effects are greatest amongst heavier drinkers and those in lower SEC groups, with the steepest gradients and greatest overall effects being seen for the two policies which incorporate a 60p MUP.

Table 3.3 - Summary of modelled policy impacts on alcohol-attributable deaths

		Population	Moderate	Increasing risk	High risk	SEC1 (highest)	SEC2	SEC3 (lowest)
	Baseline alcohol-attributable deaths per annum	12,190	-2,876	4,991	10,075	3,283	2,684	6,223
Cumulative change in deaths over 5 years	Duty escalator	-1,044	-89	-494	-461	-249	-241	-554
	Duty freeze	466	43	220	203	110	108	248
	Duty cut	774	69	365	340	182	179	413
	Duty escalator + 60p MUP	-3,444	-247	-1,237	-1,960	-48	-598	-2,799
	60p MUP	-2,684	-179	-874	-1,631	169	-405	-2,448
Change in deaths in year 10	Duty escalator	-544	-17	-263	-265	-129	-123	-293
	Duty freeze	258	9	124	124	61	58	139
	Duty cut	355	14	171	171	83	80	192
	Duty escalator + 60p MUP	-1,221	-35	-455	-731	-66	-213	-941
	60p MUP	-810	-23	-254	-532	51	-110	-750
Change in deaths in year 20 (full effect)	Duty escalator	-733	-47	-351	-335	-164	-163	-406
	Duty freeze	344	23	165	156	77	77	191
	Duty cut	474	33	227	214	105	106	263
	Duty escalator + 60p MUP	-1,722	-88	-639	-995	-102	-303	-1,317
	60p MUP	-1,166	-50	-370	-745	47	-169	-1,044
Relative change in deaths per annum (full effect)	Duty escalator	-6.0%	1.6%	-7.0%	-3.3%	-5.0%	-6.1%	-6.5%
	Duty freeze	2.8%	-0.8%	3.3%	1.5%	2.3%	2.9%	3.1%
	Duty cut	3.9%	-1.1%	4.5%	2.1%	3.2%	3.9%	4.2%
	Duty escalator + 60p MUP	-14.1%	3.1%	-12.8%	-9.9%	-3.1%	-11.3%	-21.2%
	60p MUP	-9.6%	1.8%	-7.4%	-7.4%	1.4%	-6.3%	-16.8%

Table 3.4 - Summary of modelled policy impacts on alcohol-attributable hospital admissions (narrow measure)

		Population	Moderate	Increasing risk	High risk	SEC1 (highest)	SEC2	SEC3 (lowest)
	Baseline alcohol-attributable hospital admissions per annum	262,166	36,760	105,230	120,176	61,437	55,487	145,242
Cumulative change in admissions over 5 years	Duty escalator	-26,763	-6,372	-11,220	-9,171	-5,535	-5,974	-15,255
	Duty freeze	12,160	2,926	4,981	4,253	2,444	2,661	7,055
	Duty cut	19,857	4,765	8,023	7,069	3,955	4,320	11,582
	Duty escalator + 60p MUP	-91,836	-19,181	-33,367	-39,288	-5,493	-17,050	-69,293
	60p MUP	-72,650	-14,158	-24,858	-33,635	-649	-12,286	-59,715
Change in admissions in year 10	Duty escalator	-10,314	-2,216	-4,162	-3,935	-2,010	-2,131	-6,172
	Duty freeze	5,045	1,064	1,928	2,054	929	995	3,122
	Duty cut	6,953	1,469	2,628	2,855	1,265	1,361	4,326
	Duty escalator + 60p MUP	-23,498	-4,733	-8,512	-10,253	-1,780	-3,859	-17,859
	60p MUP	-15,987	-2,923	-5,226	-7,837	60	-2,035	-14,012
Change in admissions in year 20 (full effect)	Duty escalator	-10,692	-2,297	-4,342	-4,054	-1,848	-2,110	-6,735
	Duty freeze	5,220	1,099	2,008	2,113	851	983	3,386
	Duty cut	7,186	1,518	2,737	2,931	1,159	1,345	4,682
	Duty escalator + 60p MUP	-24,812	-4,847	-9,017	-10,948	-1,430	-3,668	-19,714
	60p MUP	-17,040	-2,969	-5,594	-8,478	277	-1,847	-15,470
Relative change in admissions per annum (full effect)	Duty escalator	-4.1%	-6.2%	-4.1%	-3.4%	-3.0%	-3.8%	-4.6%
	Duty freeze	2.0%	3.0%	1.9%	1.8%	1.4%	1.8%	2.3%
	Duty cut	2.7%	4.1%	2.6%	2.4%	1.9%	2.4%	3.2%
	Duty escalator + 60p MUP	-9.5%	-13.2%	-8.6%	-9.1%	-2.3%	-6.6%	-13.6%
	60p MUP	-6.5%	-8.1%	-5.3%	-7.1%	0.5%	-3.3%	-10.7%

Figure 3.5 - Summary of relative changes in health outcomes in year 20

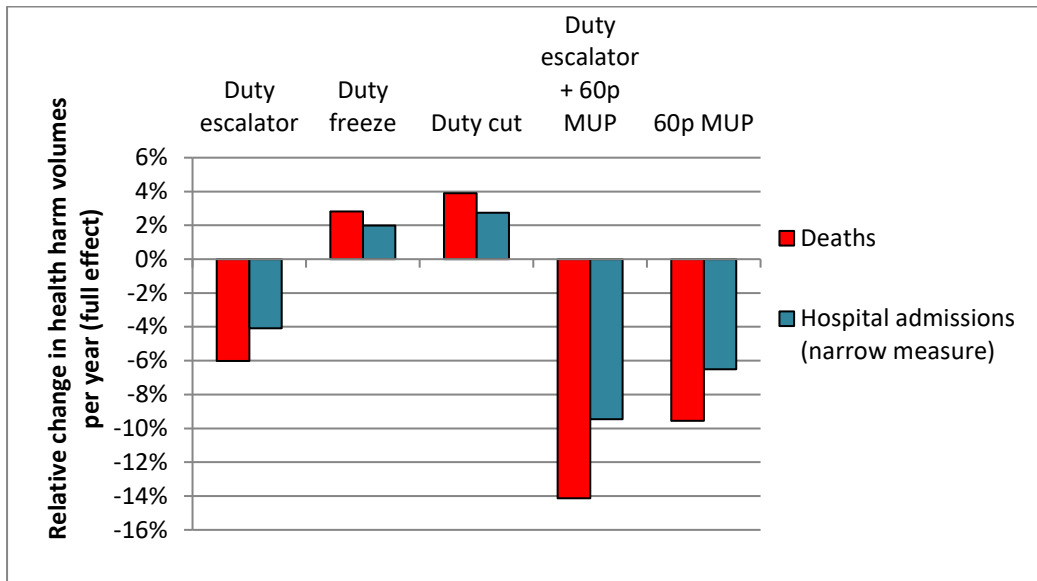


Figure 3.6 - Summary of changes in alcohol-related hospital admissions (narrow measure) by drinker group over first 5 years of modelled policies

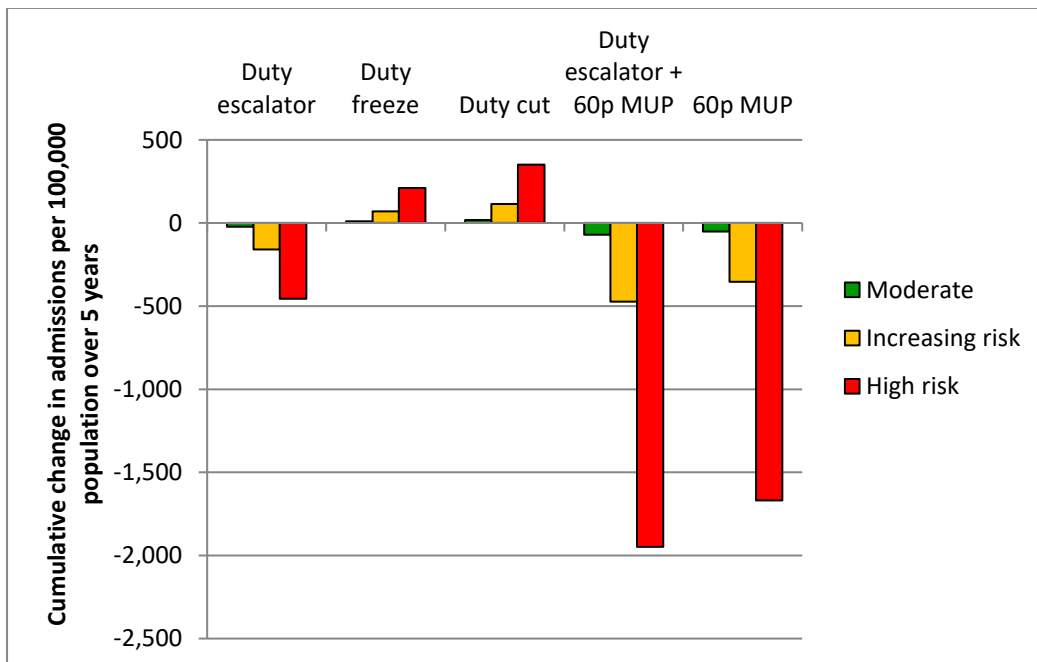
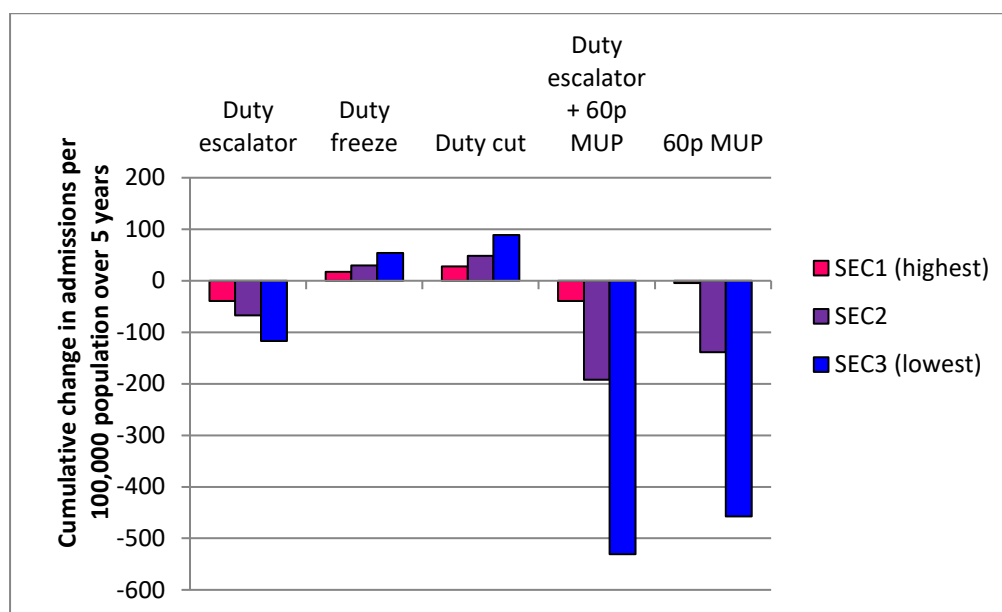


Figure 3.7 - Summary of changes in alcohol-related hospital admissions (narrow measure) by SEC over first 5 years of modelled policies



3.4 Impacts on crime and workplace outcomes

The estimated impact of all modelled policies on alcohol-attributable crime and workplace absence over the first 5 years following policy implementation are presented in Table 3.5 and Table 3.6 and illustrated in Figure 3.8. Similar patterns are observed as for consumption levels, with a duty freeze and duty cut leading to increases in both crime and workplace absence, while a duty escalator and a 60p MUP would lead to substantial reductions in both outcomes, with their combination producing the greatest effects – 441,000 fewer criminal offences and 2.1m fewer days absence over 5 years.

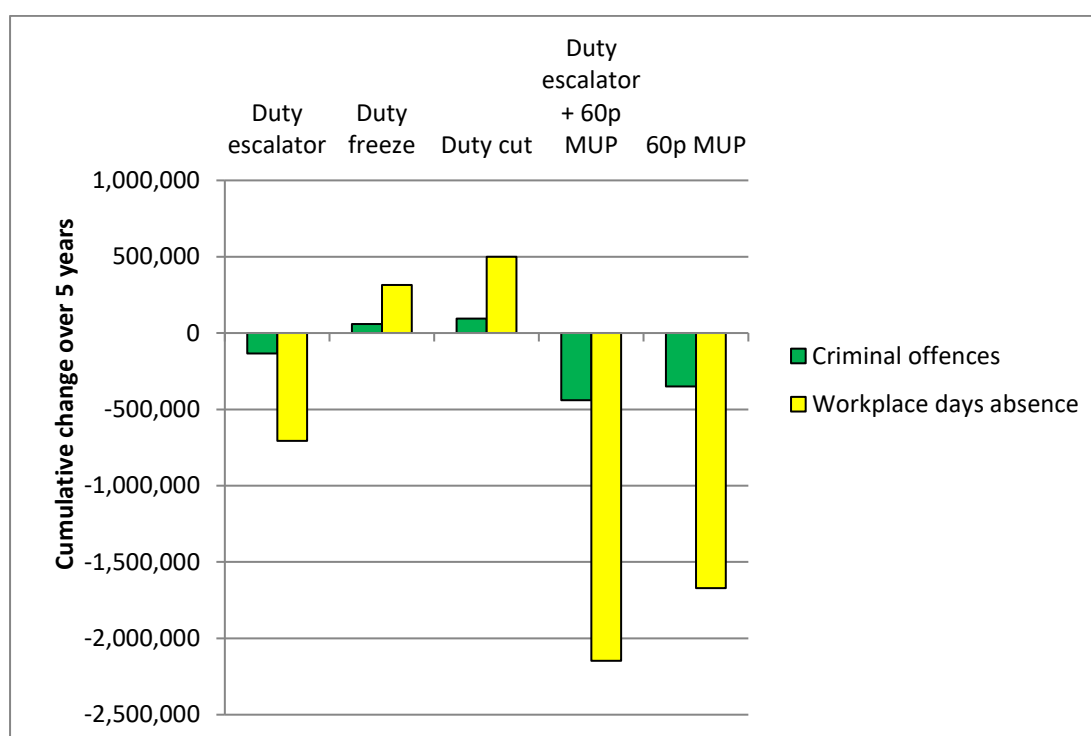
Table 3.5 - Estimated impact of modelled policies on crime outcomes

		Population	Moderate	Increasing risk	High risk
Baseline alcohol-attributable offences per annum		1,420,924	669,474	467,379	284,071
Cumulative change in offences over 5 years	Duty escalator	-134,049	-85,131	-41,730	-7,189
	Duty freeze	59,398	38,486	17,922	2,991
	Duty cut	94,420	61,195	28,479	4,746
	Duty escalator + 60p MUP	-440,813	-252,156	-151,262	-37,394
	60p MUP	-350,814	-193,114	-124,385	-33,314

Table 3.6 - Estimated impact of modelled policies on workplace absence

		Population	Moderate	Increasing risk	High risk
	Baseline annual alcohol-attributable days absence (,000s)	7,709	3,469	2,725	1,515
Cumulative change in days absence over 5 years (,000s)	Duty escalator	-707	-415	-241	-51
	Duty freeze	314	190	103	21
	Duty cut	499	301	164	34
	Duty escalator + 60p MUP	-2,147	-1,133	-766	-248
	60p MUP	-1,672	-842	-610	-219

Figure 3.8 - Summary of changes in alcohol-related crime and workplace absence



3.5 Impacts on the exchequer, retailers and societal costs

The estimated impact over the first 5 years of all modelled policies on exchequer receipts (duty and VAT) from alcohol sales is presented in Table 3.7 and Figure 3.9, showing that a duty freeze would lead to a loss to the exchequer in excess of £1bn compared to raising duty in line with inflation. A 2% duty cut, followed by a freeze is estimated to lead to an even greater loss of £2.2bn over the same period. By contrast the reinstatement of the duty escalator would lead to an estimated gain to the exchequer of £1.8bn, rising to £2.2bn with the addition of a 60p MUP (which would lead to a smaller £380m gain in isolation).

Estimated changes in revenue to retailers from alcohol sales over the first 5 years of all modelled policies are presented in Figure 3.10 and Table 3.8. Estimated impacts on the on- and off-trade are small but mixed for duty-only policies, while the off-trade is estimated to gain significantly from the

introduction of a 60p MUP (in excess of £4bn over 5 years). The on-trade is estimated to experience a small loss in revenue (around £200m) over the same period under MUP.

Excluding these economic impacts, the cumulative saving to society over 5 years through reduced NHS health care costs, improved population health, reduced crime and workplace absence are presented in Table 3.9 and Figure 3.11. This results show that freezing duty would cost society over £540m, while cutting duty would cost £870m. A 2% duty escalator would save £1.2bn, a 60p MUP £3.2bn and the two in combination over £4bn over 5 years. The majority of these savings (approx. 80%) are estimated to come from improved population health and reduced costs associated with alcohol-related crime. Note that these figures are not an estimate of the full societal cost, as many factors such as the harms of drinking on others beyond the drinker themselves are not included.

Table 3.7 - Summary of modelled policy impacts on exchequer revenue over 5 years

		Baseline tax receipts (£m)	Estimated annual change from baseline in duty + VAT revenue to government (£m)					
			Y1	Y2	Y3	Y4	Y5	Cumulative over 5 years
On-trade	Duty escalator	£4,691	£35.9	£69.6	£101.7	£132.1	£161.2	£500
	Duty freeze		-£13.0	-£38.7	-£67.9	-£96.4	-£123.1	-£339
	Duty cut		-£58.6	-£106.0	-£132.9	-£158.8	-£182.3	-£639
	Duty escalator + 60p MUP		£35.7	£70.7	£103.9	£135.6	£165.7	£511
	60p MUP		-£0.5	-£0.5	-£0.5	-£0.4	-£0.4	-£2
Off-trade	Duty escalator	£6,256	£95.0	£186.1	£272.9	£355.3	£433.2	£1,342
	Duty freeze		-£9.9	-£66.5	-£137.5	-£209.4	-£278.4	-£702
	Duty cut		-£147.0	-£266.0	-£333.7	-£399.2	-£458.6	-£1,605
	Duty escalator + 60p MUP		£163.6	£253.4	£339.0	£420.2	£497.1	£1,673
	60p MUP		£81.3	£78.6	£75.9	£73.3	£70.9	£380
Total	Duty escalator	£10,947	£130.8	£255.7	£374.6	£487.4	£594.4	£1,843
	Duty freeze		-£22.9	-£105.3	-£205.4	-£305.8	-£401.5	-£1,041
	Duty cut		-£205.7	-£372.0	-£466.6	-£557.9	-£640.8	-£2,243
	Duty escalator + 60p MUP		£199.3	£324.1	£442.9	£555.8	£662.8	£2,185
	60p MUP		£80.8	£78.1	£75.5	£72.9	£70.4	£378

Table 3.8 - Summary of modelled policy impacts on retailer revenue over 5 years

		Baseline revenue (£m)	Estimated annual change from baseline in retailer revenue (£m)					
			Y1	Y2	Y3	Y4	Y5	Cumulative over 5 years
On-trade	Duty escalator	£9,174	-£15.6	-£26.4	-£34.6	-£40.9	-£46.2	-£164
	Duty freeze		£5.3	£21.0	£39.2	£58.9	£77.1	£202
	Duty cut		£37.9	£69.1	£87.1	£104.7	£120.8	£420
	Duty escalator + 60p MUP		-£50.5	-£57.8	-£62.6	-£65.8	-£68.0	-£305
	60p MUP		-£36.7	-£35.5	-£34.3	-£33.1	-£32.0	-£171
Off-trade	Duty escalator	£3,225	£29.4	£74.7	£124.5	£175.0	£222.7	£626
	Duty freeze		-£36.9	-£41.7	-£34.9	-£23.2	-£9.9	-£147
	Duty cut		£21.8	£39.7	£50.0	£60.1	£69.3	£241
	Duty escalator + 60p MUP		£876.7	£890.7	£910.1	£931.1	£950.6	£4,559
	60p MUP		£929.8	£898.4	£868.0	£838.7	£810.3	£4,345
Total	Duty escalator	£12,399	£13.8	£48.4	£90.0	£134.1	£176.5	£463
	Duty freeze		-£31.6	-£20.7	£4.3	£35.7	£67.3	£55
	Duty cut		£59.7	£108.7	£137.1	£164.7	£190.1	£660
	Duty escalator + 60p MUP		£826.2	£832.9	£847.4	£865.4	£882.6	£4,254
	60p MUP		£893.1	£862.9	£833.8	£805.6	£778.3	£4,174

Table 3.9 - Summary of financial valuation of policy impacts on health, crime and workplace related harm over first 5 years

		Cumulative saving over 5 years (£m)				
		Direct health care costs	QALY valuation	Crime costs	Work absence costs	Total
Baseline cost (£m)		£6,954.2	-	£27,223.7	-£3,176.8	£31,001.1
Absolute value of savings	Duty escalator	£132.4	£304.5	£534.0	£59.2	£1,030.1
	Duty freeze	-£60.1	-£136.8	-£238.1	-£26.4	-£461.4
	Duty cut	-£99.0	-£231.8	-£381.7	-£42.3	-£754.9
	Duty escalator + 60p MUP	£483.0	£1,163.0	£1,750.6	£176.4	£3,573.1
	60p MUP	£389.5	£946.7	£1,387.9	£136.1	£2,860.3

Figure 3.9 - Estimated change in exchequer receipts over 5 years

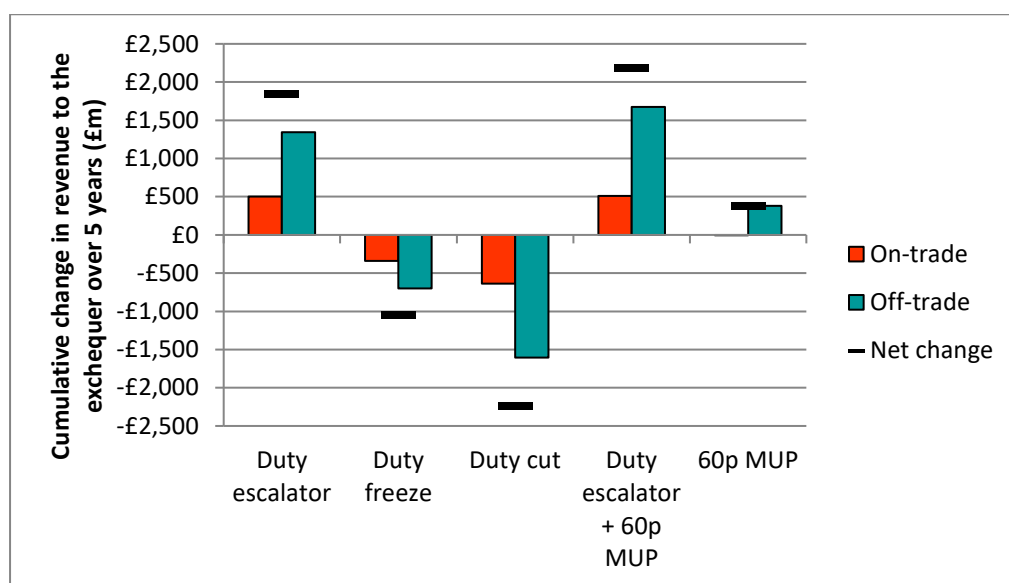


Figure 3.10 - Estimated change in retailer revenue over 5 years

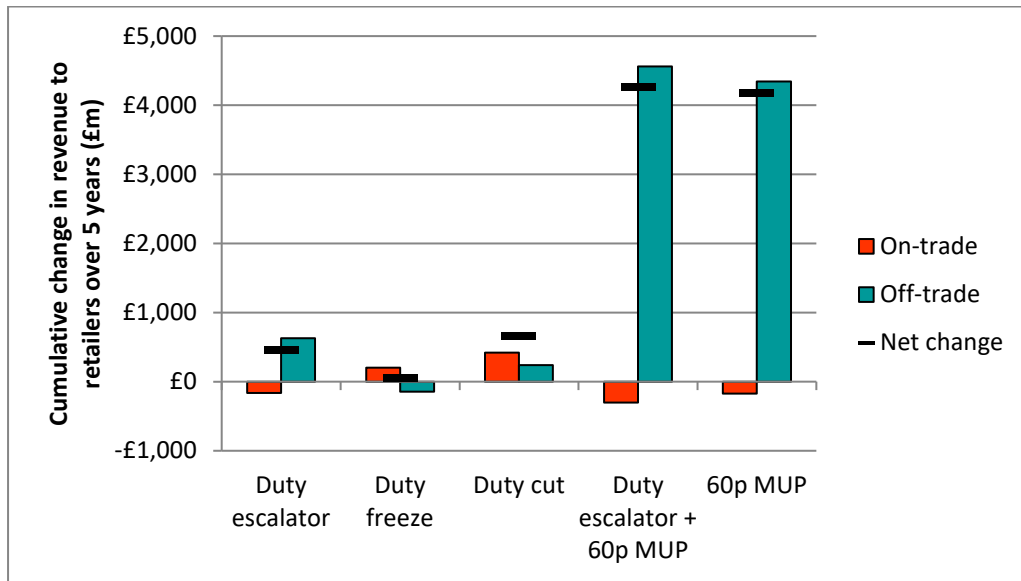
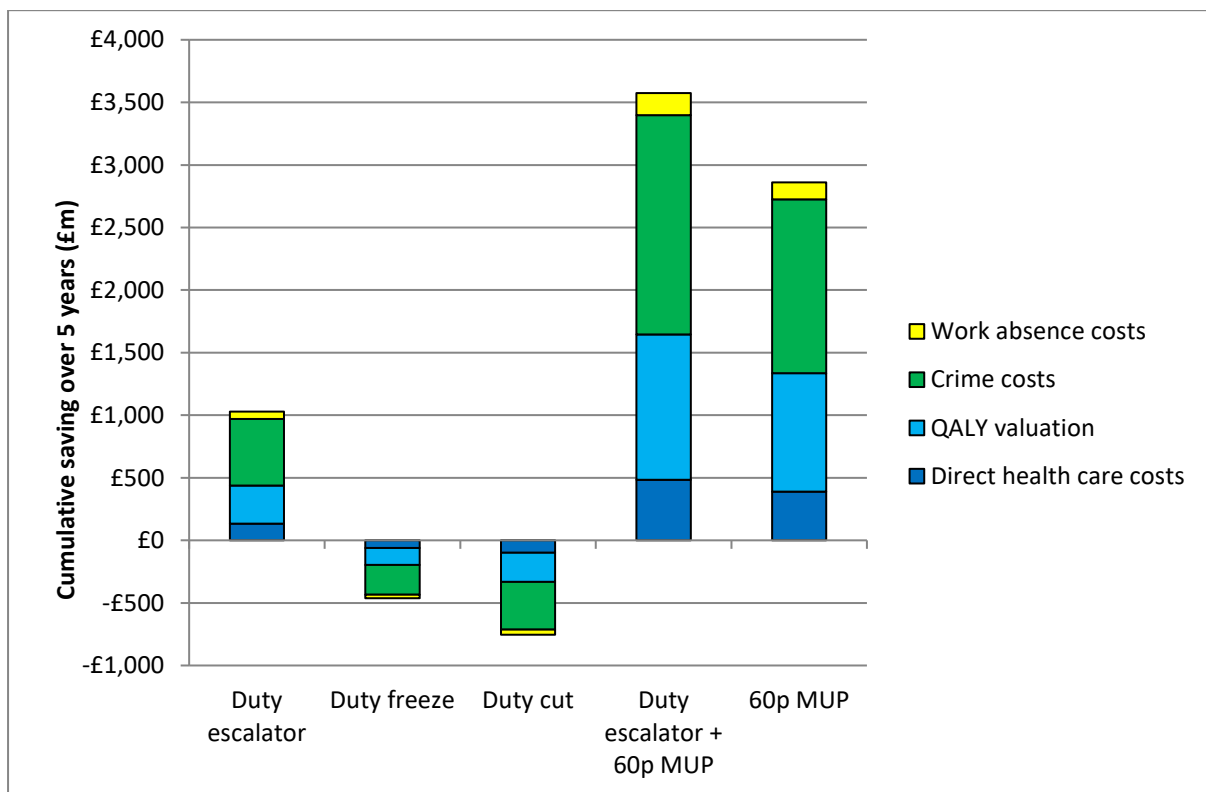


Figure 3.11 - Breakdown of cumulative value of harm reductions over 5 years by outcome



3.6 Sensitivity analyses

3.6.1 HMRC price elasticities

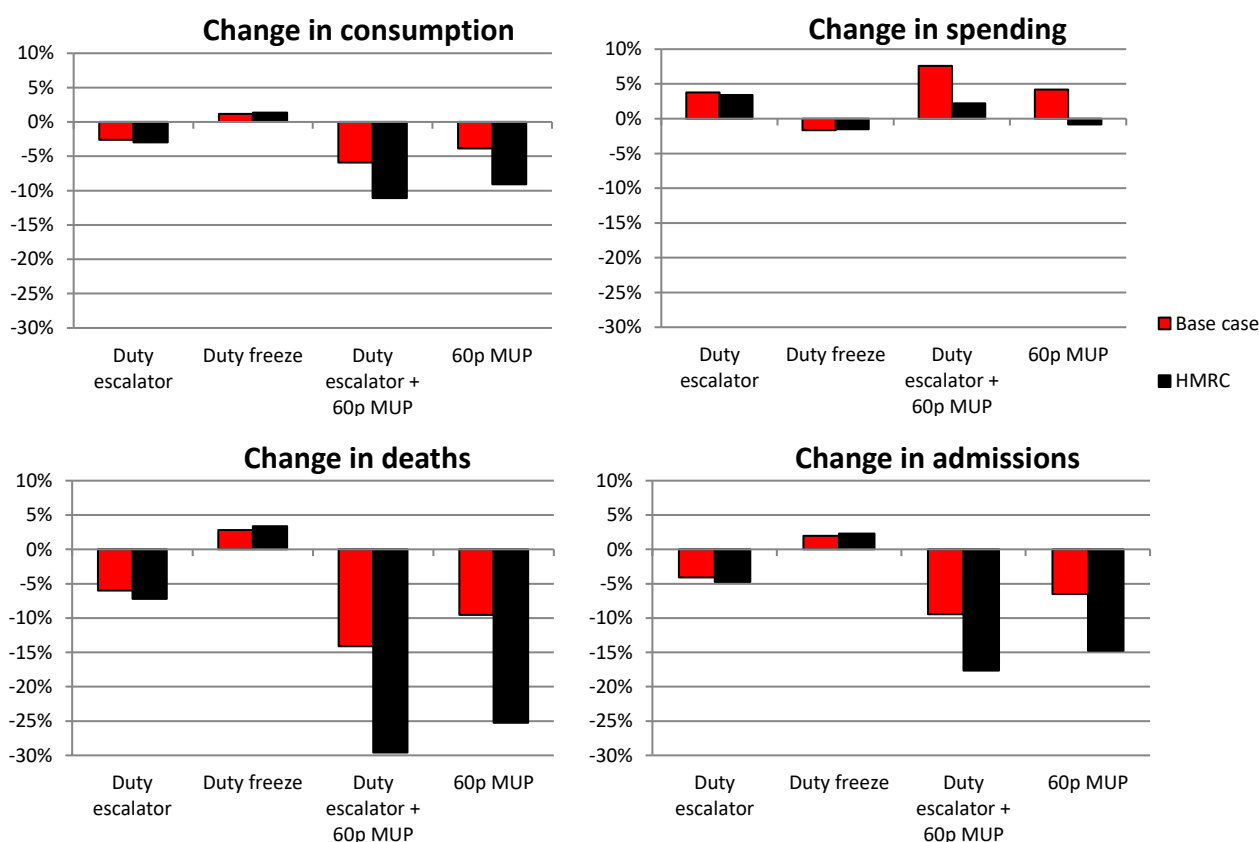
The impact on alcohol consumption, annual spending on alcohol, alcohol-related deaths and alcohol-related hospital admissions of using alternative elasticity estimates calculated by HMRC (14) is shown in Table 3.10 and Figure 3.12. These results show that the alternative elasticities lead to larger changes in alcohol consumption, lesser impacts on spending and greater changes in alcohol-

related health outcomes across all four policies. These differences are substantially greater for those policies which incorporate a 60p MUP, where the HMRC elasticities lead to effect estimates of around double those of the base case elasticities.

Table 3.10 - Impacts of alternative elasticity estimates on consumption, spending and health outcomes

	Elasticities	Change in consumption p.a. (full effect)	Change in spending p.a. (full effect)	Change in deaths p.a. (full effect)	Change in hospital admissions p.a. (full effect)
Duty escalator	Base case	-18.43	24.39	-733	-10,692
	HMRC	-21.25	21.90	-879	-12,410
Duty freeze	Base case	8.48	-10.57	344	5,220
	HMRC	9.81	-9.67	410	5,979
Duty escalator + 60p MUP	Base case	-41.87	48.88	-1,722	-24,812
	HMRC	-78.78	14.33	-3,605	-46,302
60p MUP	Base case	-27.41	26.85	-1,166	-17,040
	HMRC	-64.55	-5.48	-3,076	-38,751

Figure 3.12 - Impact of alternative elasticity estimates on relative policy effects



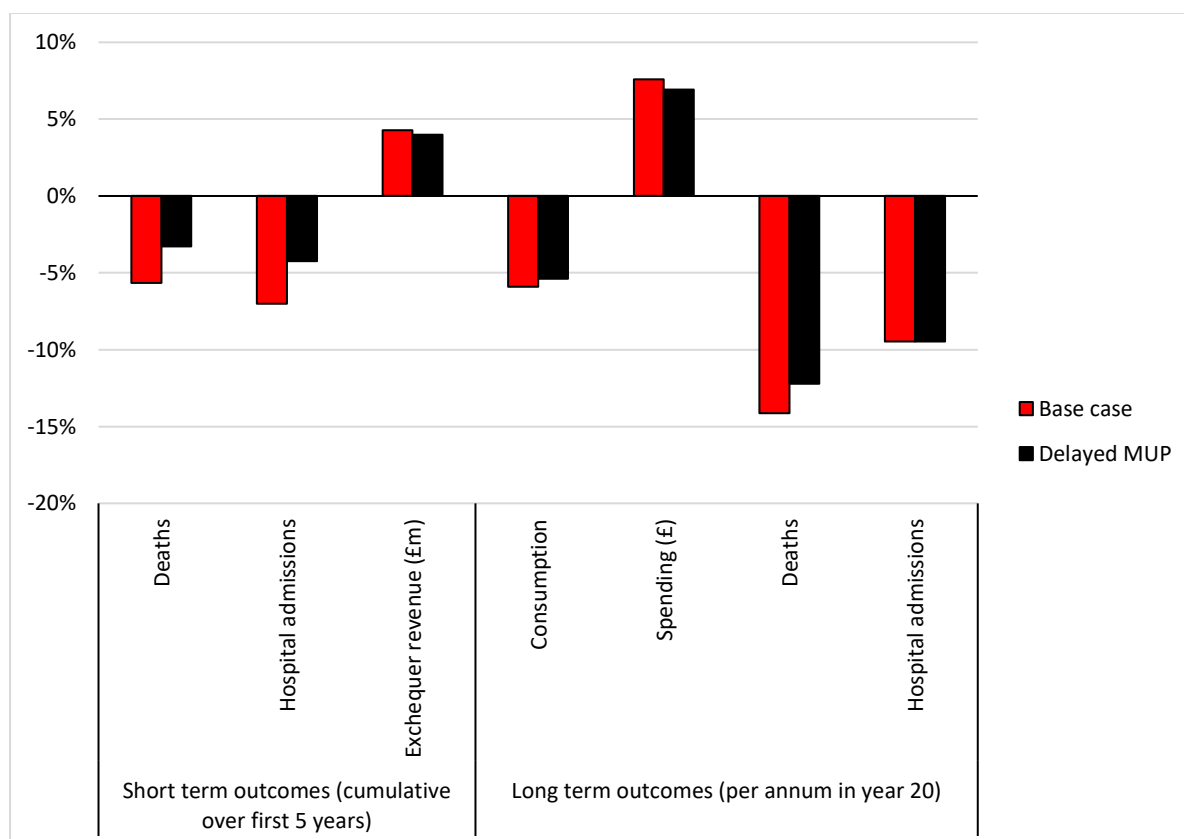
3.6.2 Delayed implementation of MUP

The estimated impact on a combined duty escalator and 60p MUP policy of delaying the introduction of MUP until the third year of the policy are shown in Table 3.11 and Figure 3.13. These results show that the short term impact over the first 5 years on health outcomes is considerable, although the impact on exchequer revenue is small. Smaller differences in effect persist even in the longer term, although the overall scale of impact is still greater than any other modelled policy.

Table 3.11 - Estimated impact of delayed introduction of MUP

	Short term outcomes (cumulative over first 5 years)			Long term outcomes (per annum in year 20)			
	Deaths	Hospital admissions	Exchequer revenue (£m)	Consumption	Spending (£)	Deaths	Hospital admissions
Base case	-3,444	-91,836	2,185	-41.87	48.88	-1,722	-24,812
Delayed MUP	-2,005	-55,642	2,038	-38.28	44.59	-1,488	-24,812

Figure 3.13 – Estimated impact of delaying MUP implementation on relative outcomes



4 DISCUSSION

4.1 Summary of results

The results of the modelling work presented in this report show that reducing alcohol prices in real terms, either through freezing or cutting duty, leads to increased alcohol consumption and consequently greater levels of alcohol-related harm. These impacts can be substantial, for example a duty cut is estimated to lead to almost 800 additional alcohol-attributable deaths and 20,000 alcohol-related hospital admissions over 5 years, increasing to almost 500 deaths and over 7,000 admissions per year by the time the full impact of the policy has been felt after 20 years. In contrast a duty escalator is estimated to reduce alcohol consumption and lead to a 6% reduction in alcohol related deaths and a 4.1% reduction in alcohol-attributable hospital admissions as well as reducing alcohol-related crime and workplace absence.

On all outcomes measures, the impact of a 60p MUP is estimated to be greater than a duty escalator, however there are key differences in terms of the distribution of effects. Most importantly the changes in consumption and spending are spread more equally across consumption and SEC groups under duty raises than a MUP, meaning the policy is less well targeted, leading to smaller health gains and a greater impact on the spending of those in the lowest SEC group. The other major difference is in the estimated impact on exchequer and retailer receipts, with a duty escalator leading to significantly greater gains to the treasury (£1.8bn over 5 years compared to £380m for a 60p MUP). This pattern is reversed in terms of the estimated impact on off-trade retailers.

Combining a duty escalator with a 60p MUP is estimated to lead to the largest reduction in alcohol consumption, alcohol-related deaths and hospital admissions, alcohol-related crime and workplace absence and the largest increase to exchequer receipts of all modelled policies. The consumption and SEC group gradient in effect is markedly steeper than for the duty escalator alone, although the impact on both consumption and spending for moderate drinkers is approximately twice that estimated under a 60p MUP alone.

Sensitivity analyses suggest that the results presented here may be conservative, as the use of alternative elasticities derived by HMRC leads to notably larger estimates of effectiveness for the modelled policies, particularly those incorporating a MUP. Other analysis also suggests that a delay in implementing the MUP component of a combined duty escalator and MUP policy would reduce the overall impact, particularly in the short term, however the overall scale of benefits would still be greater than any other modelled policy.

4.2 Limitations

The strengths and limitations of SAPM have been discussed at length elsewhere (2,15), however there is a key limitation of the taxation model which has not previously been discussed. A recent study in the UK found clear evidence that retailers do not pass through changes in taxation to the prices faced by consumers equally across all products (16). This study found that the prices of cheaper products increased by less than would be expected, while more expensive products increased by more than would be expected, suggesting that retailers 'cross-subsidise' – offsetting a loss on the profit margin of cheaper products with a gain from more expensive products. Of relevance to the present modelling work, however, is the fact that the majority of the tax changes examined by Ally et al. were increases, and there is good reason to believe that this 'tax

passthrough' effect is not symmetric under tax cuts (i.e. when taxes are cut one might not expect the prices of the cheapest alcohol to change the least). In light of this limitation we have excluded this evidence from all of the modelling work presented here. If it were included in the modelling of the duty escalator policy it is likely that the overall effect at the population level would not change significantly, although the distribution of effects would change slightly, with the policy having a greater effect on moderate drinkers (who buy more of the expensive alcohol which is 'over-shifted') and a smaller impact on high risk drinkers.

4.3 Conclusions

The results presented here provide strong evidence that:

- Cutting alcohol prices in real terms, either by cutting or freezing alcohol duty, is estimated to lead to increased alcohol consumption, increased alcohol-related harm and reduced receipts to the exchequer
- Increasing alcohol prices through a duty escalator is estimated to reduce alcohol consumption by around 2.6% and alcohol-related deaths by 6.0% per year
- The implementation of a 60p MUP is estimated to have even greater effects, with alcohol consumption reducing by 3.9% and alcohol-related deaths by 9.6%
- A duty escalator is expected to bring significant additional revenue to the exchequer, while a 60p MUP has a substantially smaller (although still positive) effect on tax receipts
- There are important differences in the distribution of consumption, spending, health, crime and workplace impacts across the population between taxation and MUP policies
- The combination of a duty escalator with a 60p MUP is estimated to lead to the greatest gains in alcohol-related health, crime and workplace harms and exchequer revenue of all modelled policies, even if implementation of the MUP aspect is delayed for several years.

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