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Original Research

Evaluating the impact of minimum unit alcohol pricing on purchasing behaviour by different social class and age groups in Wales: A controlled interrupted time series study

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ABSTRACT

Objectives: Alcohol consumption and its associated harms pose a significant challenge to public health in the UK. To address this issue, Wales implemented a Minimum Unit Price policy (MUP) in February 2020, setting a minimum price of 50p per UK unit of alcohol (10 ml/8 g). In this study we evaluate the policy's impact on alcohol sales metrics to gauge its effectiveness in improving public health outcomes.
Study design: Controlled interrupted time series study.
Methods: Analysis was conducted on alcohol sales data from February 2016 to February 2022, using the Kantar WorldPanel dataset, which tracks household alcohol purchases. The study employed a difference-in-difference and dynamic differences approach with controls for year fixed effects and a control for COVID-19, comparing the impact of the MUP in Wales to England, where no policy was introduced. Key outcomes included mean spend on alcohol per shopping trip, mean price per litre, proportion of households purchasing each type of alcohol (penetration), and average volume of alcohol purchased (average weekly purchase in volume and spend).
Results: MUP was associated with reduced alcohol purchases, notably among drinkers under 28 favouring cheap high-strength alcohol like cider. Effects varied by demographics and alcohol type. Those aged under 28 decreased cider consumption by 50 % compared to England, possibly switching to lager, which saw a 33 % spending increase. Older consumers exhibit short-term price insensitivity. Additionally, there was a 1.33 percentage point rise in wine consumption among lower socioeconomic groups.
Conclusions: MUP in Wales changed purchasing behaviour, which should lead to public health benefits in the longer term. There were some interesting effects by age group and alcohol type.

1. Introduction

Pricing policies are among the most effective and cost-effective approaches to address alcohol harm, reflected in their status as one of the World Health Organization's 'Best Buy' policies.[1] Historically taxation has been the primary tool through which governments can influence the price of alcohol, however in recent years Minimum Unit Pricing (MUP) policies have risen to prominence. MUP involves setting a floor price for alcoholic drinks below which a fixed volume of alcohol cannot be sold. Various jurisdictions (Armenia, Australia's Northern Territory, Scotland, the Republic of Ireland and Ukraine) have implemented a MUP in the past decade and similar floor pricing policies have been in place in others for many years (including several Canadian provinces, Moldova, Russia, Slovakia and Uzbekistan, Australia's Northern Territory), although these often only relate to specific beverage types such as vodka.[2] Wales became the second nation in the UK, after Scotland, to introduce a comprehensive MUP for all alcohol on March 2, 2020, set at a level of 50p per UK unit of alcohol (10 g/8 ml of ethanol).

The international evidence on the effectiveness of MUP at reducing alcohol consumption and harm is strong, including studies from the evaluation of the introduction of MUP in Scotland which have demonstrated a 3 % reduction in population alcohol consumption[3] and a 13.4 % reduction in alcohol-specific deaths.[4] Other studies from Scotland have found the greatest impact on the alcohol consumption of heavier drinkers, women and those on lower incomes[5,6] and the largest reduction in alcohol-specific mortality in the most deprived groups.[7]

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However, there remains limited evidence on the longer-term impacts of MUP, especially in Wales, where studies so far have largely captured the policy's short-term effects and have not fully explored the interplay of MUP with the COVID-19 pandemic or look in detail at shifts between different types of alcohol. It was hypothesised that MUP would lead to shifts from spirits (e.g. vodka) and cheap, high strength wide cider to other types of alcohol.[8]

Modelling work prior to the introduction of MUP in Wales suggested that a 50p MUP would reduce alcohol consumption by 3.6 % with the largest reductions in heavier drinkers, while increasing consumer spending on alcohol by 1.4 %.[9] The model used was the Sheffield Alcohol Policy Model Version 3 (SAPM3), a sophisticated framework combining consumer behaviour analysis and health impact simulations to assess alcohol policy effects.

Jones[10] and Cartwright[11] studied pre-MUP/post-MUP and COVID-19 impact using qualitative studies, respectively. Cartwright[11] notes a decrease in non-binge drinkers, but self-reported surveys limit insights compared to data on purchasing or consumption patterns. Buhociu and colleagues[12] found few individuals took preparatory actions due to time constraints. Holloway et al.[13] reported similar findings, especially among those receiving alcohol-related support. Bartasevicius et al.[14] investigated retailers' expectations, revealing awareness and preparations, such as staff training and adjusting stock. Holloway et al.[15] found minimal impact of the MUP on drinking patterns, attributing any changes to COVID-19, their evaluation was based on data collected nine months after the implementation of MUP, and the subsequent wave of data collection, occurring after the resolution of major national lockdowns in Wales, is stated will offer a valuable opportunity to assess the true impact of MUP while controlling for the confounding effects of the pandemic. This highlights the challenge of isolating the effects of MUP from the significant disruptions caused by the COVID-19 pandemic, a theme that we address further through our methods and controls in this study. Perkins and colleges[16] reported reduced cheap alcohol availability, some switching to cheaper spirits, and no evidence of substance switching to drugs.[12] Another study predicted limited substance switching, mainly within alcohol, aligning with prior findings.[13]

Anderson et al.[17] studied MUP policies in Scotland and Wales using a controlled interrupted time series (CITS) where England was the control for each, they found an 8.2 % price increase in Wales and there being no increase in alcohol spending for those households that generally brought small amounts of alcohol and in particular low-income households in Wales. They also found alcohol purchases decreased by 7.1 g per adult household per day for those in Wales, with there being sharper declines in cider and spirits. The study primarily captures immediate impacts, however it leaves uncertainties about long-term sustainability and potential confounding from short-term pandemic-related effects, as data was only considered up until July 2020. Livingston et al.[18] evaluated MUP's two-year impact using a qualitative approach, highlighting high compliance, increased cheap cider prices (consistent with prior research), no discernible consumption effect, and widespread policy acceptance. Whereas Bokhari et al.[19] used a triple difference analysis on retail alcohol sales in Wales with England as the control group finding the MUP policy effectively reduced cheap alcohol demand, with minimal spillover and a general decrease in consumer spending.

This study aims to evaluate the MUP's impact on alcohol purchases in Wales, focusing on price, volume, and consumer behaviour across demographics. We hypothesise that MUP will reduce alcohol purchases, especially among heavier drinkers and lower-income groups, while increasing the average price per volume. In our methodology, we explicitly consider the challenges presented by COVID-19, which coincided with MUP's introduction, and discuss how our modelling choices address these issues to isolate MUP's effects. This study builds on prior UK-based evaluations by examining longer-term impacts, addressing a key knowledge gap in the current evidence base, particularly in the Welsh context. By looking at changes in purchases over a longer time horizon than previous studies, we can assess whether changes in behaviour are sustained and reduce the influence of confounding factors, such as the COVID-19 pandemic (where pubs and bars were initially closed in March 2020 which meant that shops were the only place to buy alcohol for a period), which coincided with the introduction of the MUP policy. In exploring these issues, we implement robust controls, including a COVID-19 stringency index and year fixed effects, as well as focusing on England as a control group, as it lacked MUP and allows us to better isolate the effects of the policy. For this we focus on the results for models where the parallel trends assumption holds for at least 2 out of 3 periods before MUP's introduction as violating this assumption can bias estimates.

2. Methods

We used household market research panel data collected between February 2016 and February 2022 by market research company Kantar, as part of their WorldPanel platform (henceforth KWP). KWP data was provided by the Welsh government (neither of which played a role in the design or analysis of this study). KWP is a household-level panel of approximately 30,000 households in Great Britain, each of whom records the price and full product details of all alcohol purchases brought into the home. Our sample size only included 27,500 households as we only included households for Wales and England. The panel is refreshed continuously, with households that drop being replaced on a rolling basis. KWP is designed to be representative of the general population. KWP also collects information on the head of the household which includes demographic and an occupation-based measure of social grade (e.g., grade E represents the lowest grade manual occupations and unemployed people). We analysed five main outcomes derived from the KWP data, each aggregated into 4-week periods (descriptive statistics for each of these are provided in Appendix C):

- Average price per volume (£/litre): is the average price paid on a category (i.e. alcohol) considered in relation to the volume in litres.
- Penetration (%): is the proportion of the region's households that have purchased a category (i.e. alcohol) in each 4-week period.
- Spend per trip (£): is the average amount spent on a category (i.e. alcohol) for each purchase trip.
- Average weekly purchase (AWP) in volume (litres): is the average amount brought per household in terms of volume in each 4-week period.
- Average weekly purchase (AWP) in spend (£): is the average amount spent per household on a category (i.e. alcohol) in each 4-week period.

We calculated these outcomes for England and Wales for eight alcohol types (wine, spirits, sparkling wine, FABs (flavoured alcoholic beverages – also commonly called alcopops), cider, ale, fortified wine, lager).

A significant challenge in our analysis is the fact that MUP was introduced in Wales on March 2, 2020, less then a month before COVID-19 restrictions were introduced that severely restricted movement and shut non-essential services including pubs, bars, restaurants and nightclubs. As a result, alcohol sales from shops increased sharply as purchases were displaced. In order to address this issue, we used a difference-in-differences design under a quasi-experimental setting

naturally allocating households into treatment (Wales) and control (England) groups, with Wales affected by the MUP policy and England serving as an unaffected control. Bartasevicius et al.[14] use a CITS for their study and assert that England, not Scotland, is a better comparison for Wales when using alcohol purchasing (KWP) and sales (TRDP) data, since Scotland's minimum price legislation on alcohol was implemented in May 2018. The difference-in-differences method relies on the common shocks' assumption requiring no simultaneous unobservable factors affecting both the treatment assignment and the outcome variable. Moreover, COVID-19's concurrent impact is accounted for using appropriate controls and year fixed effects to isolate the MUP policy's effect. Hence, a control for the differing alcohol policies between England and Wales is included to account for the absence of MUP in England. This allows for a clearer distinction between the impacts of MUP in Wales and the broader pandemic effects on alcohol consumption. This follows the recommendation by Holloway et al.[15] that COVID-19 presents a particular challenge in assessing the impact of the MUP policy due to its potential confounding effects, and as such, any thorough evaluation of the policy's impact must account for these confounding variables. The parallel trends assumption is also required for the difference-in-differences method, we focus on results for models where the parallel trends assumption held for 2 out of 3 periods before MUP's introduction (2016–2018), as violating this assumption can bias estimates. Inspection of the pre-MUP trends, see Fig. 1 is broadly parallel pre-intervention trends across three of our outcomes (excluding penetration). However, acknowledging its limitations, robustness checks are discussed later to further validate the difference-in-differences analysis findings. This involved conducting additional checks by incorporating alternative model specifications and variables, confirming that the baseline model provided the best fit and that its results were consistent with the controlled models.

Equation (1) shows the empirical set up:

$$Y_{ct} = \alpha + \beta_1 WALES_c + \beta_2 Post_t + \beta_3 (WALES_c * Post_t) + \eta_t + \beta_5 \Theta_{ct} + \varepsilon_{ct}$$

where Y_{ct} is the outcome of interest of the region in month t (for example average spend per trip etc). $WALES_c$ is a dummy variable which equals 1 if the region was treated with the MUP policy when the data is gathered. $Post_t$ is a binary variable which equals 1 if the data gathered is after MUP policy implementation (March 2020 or later). β_3 is the coefficient of interest which measures the effect from the MUP policy on each outcome and captures the differential treatment effects over time. The regression also controls for year fixed effects shown by η_t and a control for COVID-19 Θ_{ct} taken from the Oxford COVID-19 Government Response Tracker's stringency index.[20] ε_{ct} is the region by time error term and ct represents the region by time effects. Year fixed effects control for the business cycle, neutralising economic shocks. The treatment effect is computed as the difference across time in the difference between our regions. Ordinary least squares estimates equation (1), and robust standard errors address heteroscedasticity concerns. The overall model was fitted for each beverage type then for the specific social grades within this data.

The coefficient of interest gauges the impact of the MUP policy on outcomes in Wales compared to the control group, England, during the post-treatment period (from March 2020 onwards). The interaction coefficient's significance determines if there are statistically significant differences in outcomes between the treatment and control groups. To explore potential changes in impacts over time we also fitted a dynamic differences model with MUP-year interaction terms for all outcomes – see Appendix A for further details.

3. Results

In Fig. 1, time series charts display the evolution of outcomes, including total AWP in volume (litres), total AWP in spend (£), total spend per trip (£), and total average price per volume (£/litre) for Wales

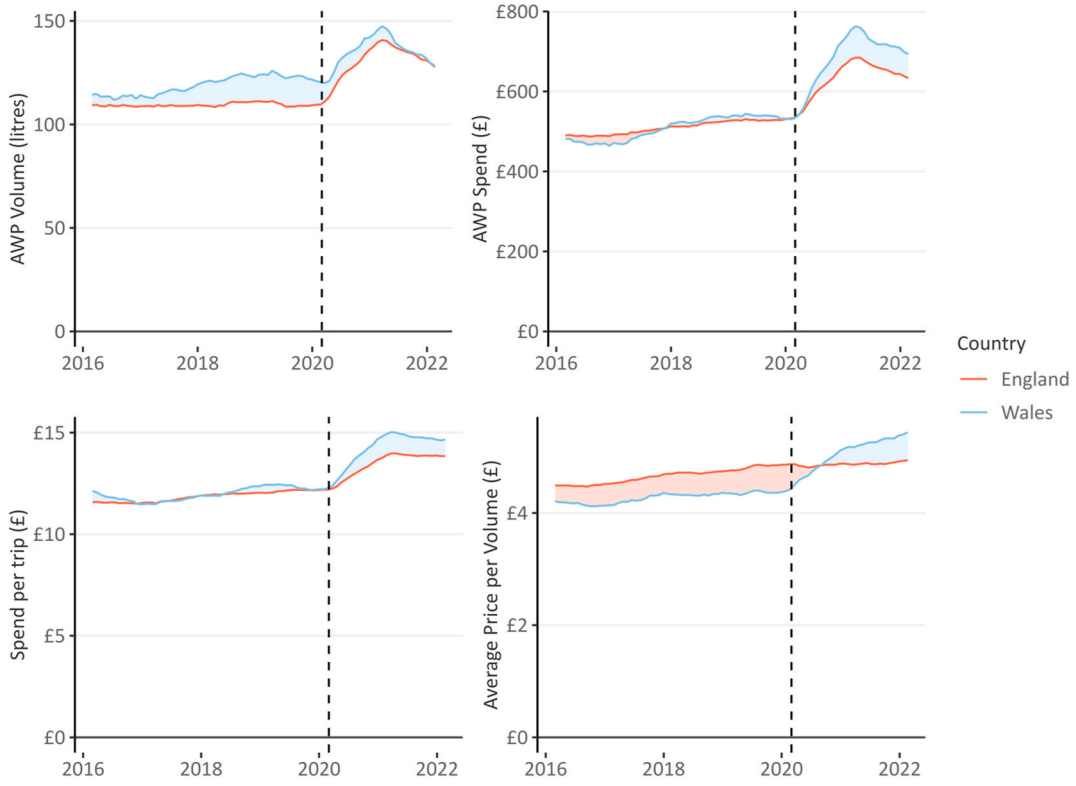

Fig. 1. Evolution of total AWP in terms of volume, total AWP spend, total spend per trip and average price per volume for England and Wales are shown for all alcoholic drinks combined. [Own analysis of Kantar's Worldpanel Take Home data from February 2016 to February 2022].

Table 1
Difference-in-difference results with controls for year fixed effects and a control for COVID-19 for outcomes where pre-trends are parallel for all 3 pre-treatment periods. Robust standard errors in parentheses. Own analysis of Kantar's Worldpanel Take Home data from February 2016 to February 2022 on alcohol sales is used and data for a stringency control for COVID-19. ***p < 0.01, **p < 0.05, *p < 0.1

Variables	(1)	(2)	(3)	(4)
	Wine Penetration for Social Class E	Spirit Penetration for Social Class E	Total AWP in Volume for Social Class E	Cider Spend per Trip for those aged 45 to 54
MUP Eligible * Post 2019	1.329*	0.502	4.058**	0.673***
	(0.708)	(0.785)	(1.986)	(0.139)
MUP Eligible	11.11***	10.05***	−7.087***	1.174***
	(0.221)	(0.290)	(0.778)	(0.0504)
Post 2019	1.536	1.720**	−8.330*	0.300
	(1.567)	(0.861)	(4.483)	(0.316)
Includes year fixed effects	Yes	Yes	Yes	Yes
Includes COVID-19	Yes	Yes	Yes	Yes
Observations	158	158	158	158
Adjusted R-squared	0.929	0.889	0.766	0.871
Mean of Dep. Var.	57.39	60.87	95.95	7.51
Std. Dev. of Dep. Var.	6.33	5.83	11.72	0.84

and England. AWP in volume shows the average amount brought per household in terms of volume in each 4-week period. AWP in volume initially increased and then sharply declined post-MUP implementation. Wales saw a more rapid increase in AWP in total spend and spend per trip, likely influenced by the MUP policy, evident from the rise in average prices across all drinks. Further time series charts can be found in Appendix B.

Full results for all models are presented in Appendix C, we focus on the results for models where the assumption of parallel trends held for all periods, or in 2 out of 3 periods prior to the introduction of MUP, as violation of this assumption may lead to biased estimates. Four models had parallel trends across all periods – results for these are shown in Table 1 and Fig. 2.

Fig. 2 presents dynamic differences results for models with parallel pre-trends for 95 % confidence limits of the interaction estimates. This suggests no anticipation of the policy or behaviour changes in Wales before its implementation. For wine penetration in Wales compared to the control group England, Fig. 2 shows an initial increase and subsequent decline post-MUP implementation. The interaction coefficient in Table 1, column 1, indicates a significant 1.33 percentage point increase (2 % relative to the sample mean) for wine penetration in the lowest socioeconomic group (grade E). No significant difference for spirits is observed between Wales and England. This suggests a temporary rise in household purchases, potentially influenced by shifts in alcohol marketing or households adapting to the MUP policy.

Fig. 2 indicates an increase in cider spend per trip for those aged 45 to 54, suggesting lower price sensitivity to cider price changes affected by the policy. Consequently, their spend on cider per trip in Wales is £0.67 higher compared to the same age group in England, representing a 9 % increase relative to the sample mean for cider spend per trip in this category. Moreover, the 45 to 54 age group may have a lower proportion of hazardous or harmful drinkers,[1] aligning with the policy's intention to have a less pronounced effect on this demographic. In such a case, a decline in cider spend or consumption may not be expected, or the decline may be less significant if it occurs.

Fig. 3a and 3b, show results for models for which only 2 out of 3 periods display parallel pre-intervention trends. Hence caution must be taken when interpreting these findings. Fig. 3a reveals a sustained decline in cider penetration in Wales compared to England ($p < 0.1$), in Table 2, column 1. This aligns with expectations, anticipating increased prices for high-strength cheap alcohol post-MUP implementation in Wales, leading to reduced purchases, particularly for cider. Specifically, the figure shows a significant ($p < 0.01$) decline in cider consumption for those under 28, as indicated in Table 2, column 2. Cider penetration in this age category is 25 percentage points lower in Wales than in England, which is a 50 % decrease with respect to the penetration rate of cider for this age category in the sample. This suggests that the MUP policy is influencing a decline in cheap, high-strength alcoholic drink consumption at-risk drinkers under 28. The sustained decline from 2020 to 2022 indicates a potential shift in this demographic towards other beverages over time.

Fig. 3a indicates a decline in AWP in terms of volume for sparkling wine, accompanied by a significant increase in penetration that later stabilises. The post-MUP period shows a decrease in the average volume purchased, alongside an initial rise in penetration, suggesting an initial surge in households purchasing limited volumes of sparkling wine.

Moreover, Fig. 3a shows the average price per volume rose for lager and ales for Wales in comparison to England which are both significant ($p < 0.01$). Column 6 of Table 2 shows the average price per volume for lager rose by £0.34 in Wales which represents a 17 % increase with respect to the average price per volume for lager in the sample. However, the increase in ale prices started before the policy, suggesting potential influences beyond MUP, such as anticipatory stockpiling. Therefore, the observed rise in average price per volume may not be solely attributable to the MUP policy, as other factors could be contributing.

Column 7 of Table 2 shows the fall in AWP in terms of spend on spirits for those aged under 28 was £33.28, which is a 36 % decrease with respect to the sample AWP spend on spirits for those aged under 28. Fig. 3b shows this decline could be due to spirits becoming more expensive post-MUP hence people under the age of 28 spent less on them. But it cannot be confirmed if this is the case since pre-trends are only parallel for 2 out of the 3 periods prior to the policy so it could be another factor driving the change.

Spend per trip for those aged under 28 increased for lager as shown in Fig. 3b and the result is significant ($p < 0.01$), which suggests this may be a close substitute for drinks such as cider, which were previously cheap alcoholic drinks. Since column 8 of Table 2 shows the spend per trip on lager for this age group rose by £2.63 post-MUP implementation, which is a 33 % increase with respect to the sample spend per trip on lager for this age category. This initial substantial increase in spending indicates a notable shift in consumer preferences towards lager after the implementation of the MUP policy for those aged under 28.

Additionally, a range of robustness checks in Appendix D demonstrate that our results are robust to alternative assumptions and model specifications.

[1] https://statswales.gov.wales/Catalogue/National-Survey-for-Wales/Population-Health/Adult-Lifestyles/adultlifestyles-by-age-gender-from202021.

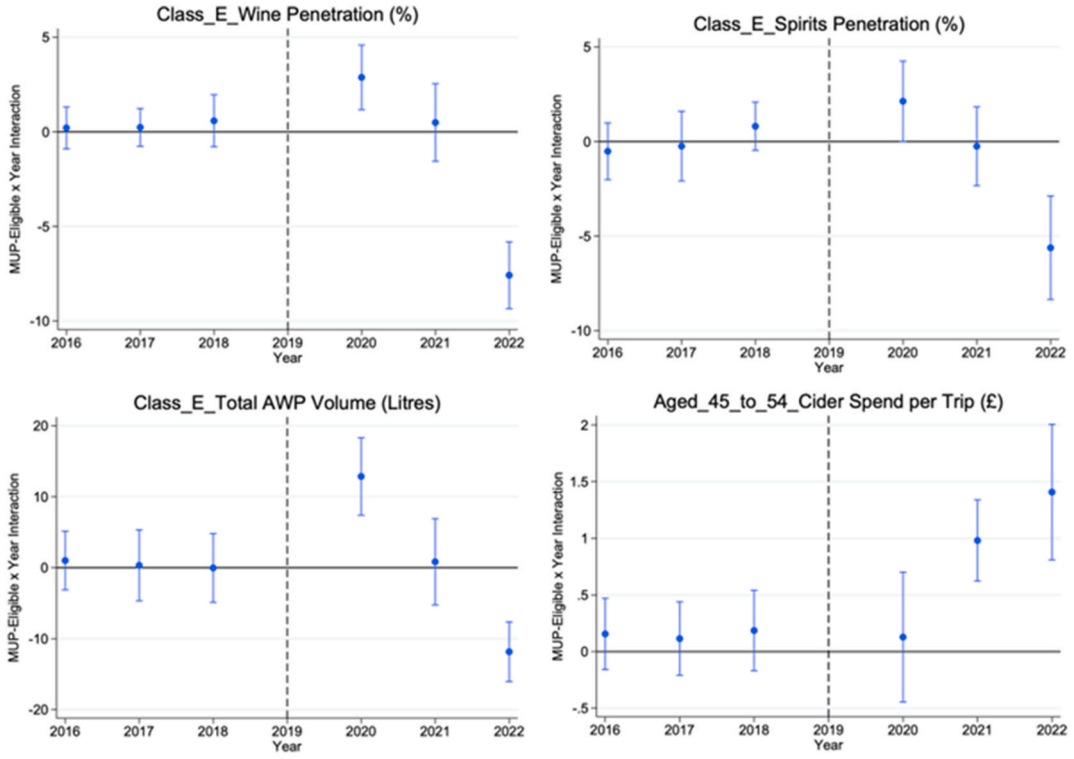

Fig. 2. MUP and the outcome variables penetration, AWP in terms of volume and spend per trip. The figure plots the coefficients which are obtained when estimating the dynamic differences model with controls for year fixed effects and a control for COVID-19 (in Appendix A) with the variable interacted with the binary variables for each year (2019 is the omitted interaction year). Own analysis of Kantar's Worldpanel Take Home data from February 2016 to February 2022. 95 % confidence limits of the interaction estimates are shown in the graphs. Regression controls for COVID-19 and year fixed effects. Robust standard errors are used so that they are heteroskedasticity-robust.

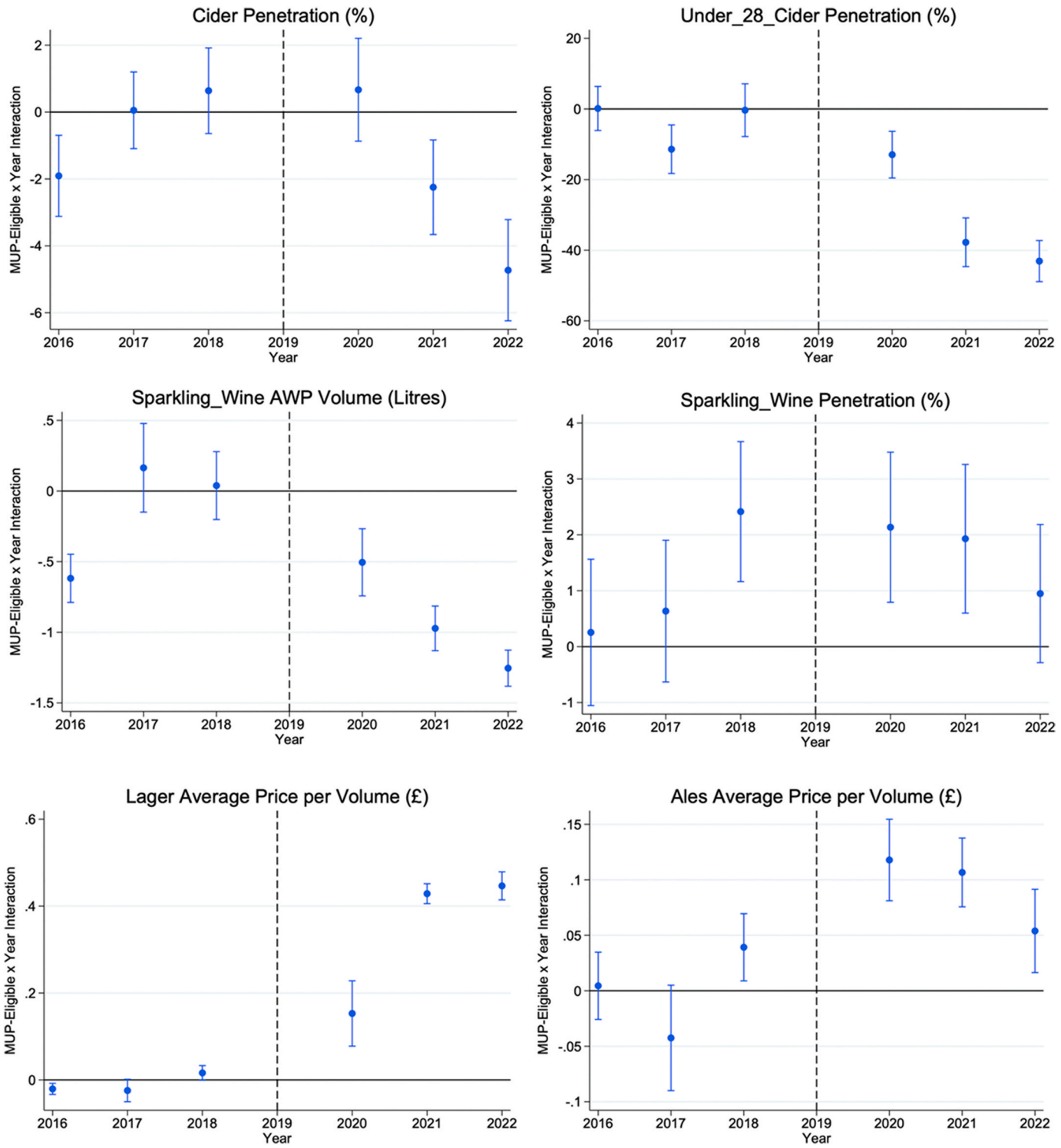

Fig. 3a. MUP and the outcome variables penetration, AWP in terms of volume and average price per volume. The figure plots the coefficients which are obtained when estimating the dynamic differences model with controls for year fixed effects and a control for COVID-19 (in Appendix A) with the variable interacted with the binary variables for each year (2019 is the omitted interaction year). Own analysis of Kantar's Worldpanel Take Home data from February 2016 to February 2022 on alcohol sales is used which was obtained from the Welsh Government. 95 % confidence limits of the interaction estimates are shown in the graphs. Regression controls for COVID-19 and year fixed effects. Robust standard errors are used so that they are heteroskedasticity-robust.

4. Discussion

The study explored the impact of the MUP policy on alcohol purchases in Wales, using purchases in England as a control. We find the introduction of the MUP policy led to higher prices for low-cost, high-strength alcoholic drinks, effectively reducing sales and increasing overall spending on alcohol.

The study observed an increase in spend per trip for lager among those under 28, suggesting a potential substitution for other drink categories. For this same age category, we find a significant reduction in purchases and consumption of strong cider and cheap spirits. Spirits saw a 36 % decrease in average weekly spending (£33·28), while cider

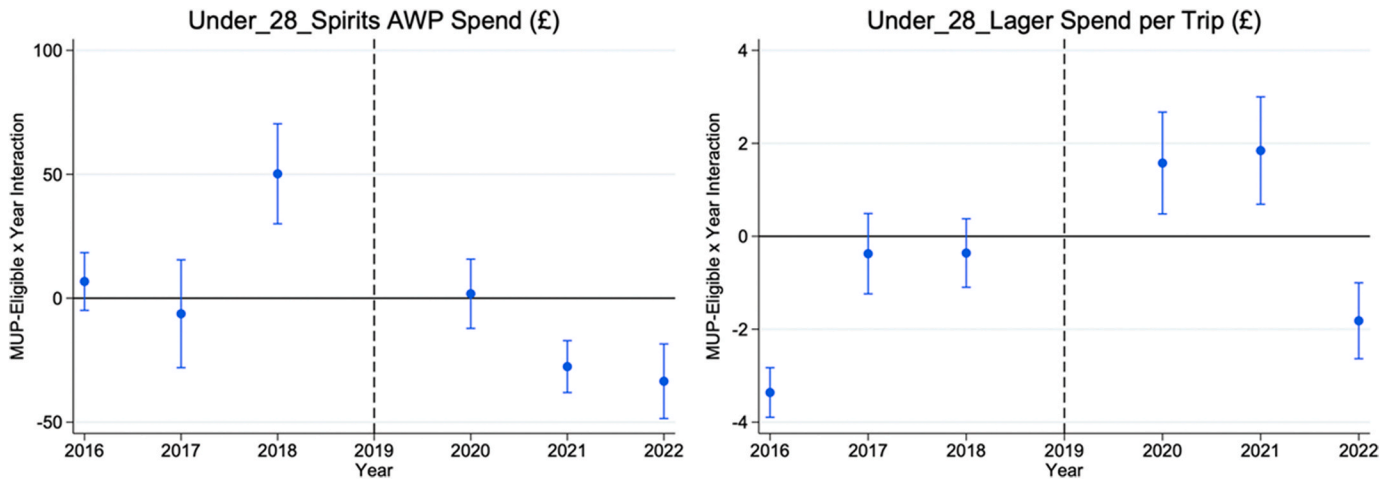

Fig. 3b. MUP and the outcome variables AWP in terms of spend and spend per trip. The figure plots the coefficients which are obtained when estimating the dynamic differences model with controls for year fixed effects and a control for COVID-19 (in Appendix A) with the variable interacted with the binary variables for each year (2019 is the omitted interaction year). Own analysis of Kantar's Worldpanel Take Home data from February 2016 to February 2022 on alcohol sales is used which was obtained from the Welsh Government. 95 % confidence limits of the interaction estimates are shown in the graphs. Regression controls for COVID-19 and year fixed effects. Robust standard errors are used so that they are heteroskedasticity-robust.

Table 2
Difference-in-difference results with controls for year fixed effects and a control for COVID-19 for outcomes where pre-trends are parallel for 2 out of 3 pre-treatment periods. Robust standard errors in parentheses. Own analysis of Kantar's Worldpanel Take Home data from February 2016 to February 2022 on alcohol sales is used and data for a stringency control for COVID-19. ***p < 0.01, **p < 0.05, *p < 0.1

Variables	(1) Cider Penetration	(2) Cider Penetration for those aged under 28	(3) Sparkling Wine AWP in Volume	(4) Sparkling Wine Penetration	(5) Average Price per Volume for Ales	(6) Average Price per Volume for Lager	(7) Spirits AWP Spend for those aged Under 28	(8) Lager Spend per Trip for those aged under 28
MUP Eligible * Post 2019	−0.899*	−25.34***	−0.788***	1.240***	0.106***	0.338***	−33.28***	2.630***
	(0.474)	(2.336)	(0.0793)	(0.282)	(0.0105)	(0.0242)	(5.018)	(0.397)
MUP Eligible	6.230***	15.62***	−1.168***	−2.158***	−0.132***	−0.0864***	0.108	0.109
	(0.193)	(1.178)	(0.0580)	(0.200)	(0.00744)	(0.00422)	(4.361)	(0.181)
Post 2019	1.238*	5.902	0.150	1.122***	−0.00901	−0.0487	−5.967	−0.0395
	(0.680)	(3.846)	(0.124)	(0.339)	(0.0287)	(0.0367)	(9.682)	(0.534)
Includes year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Includes COVID-19	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	158	158	158	158	158	158	158	158
Adjusted R-squared	0.875	0.662	0.895	0.712	0.920	0.906	0.365	0.497
Mean of Dep. Var.	49.47	50.15	8.39	45.08	2.4	1.94	91.75	7.89
Std. Dev. of Dep. Var.	3.40	11.18	0.83	1.74	0.14	0.23	31.01	1.94

penetration decreased by 51 % for those under 28. This highlights the extent to which different population groups may be affected by the MUP policy and may be relevant to policy makers seeking to understand how the public health impacts of MUP may align with specific target groups in the population.

The study also highlights substantial effects amongst some drinkers, showcasing the policy's effectiveness in discouraging purchases of cheap, high-strength beverages. It underlines the importance of considering potential lifetime harms for young individuals unaware of the negative consequences associated with alcohol consumption. Consumers' entrenched habits may persist despite price increases post-MUP implementation, indicating potential short-term price insensitivity. Long-term effects and potential substitution to cheaper drinks need thorough examination, considering varying responses to policy changes over time.

Additionally, the combined average weighted purchase in volume for social class E (state pensioners, casual and lowest grade workers, unemployed with state benefits only) in Wales increased and then declined post-2019 compared to England, indicating a rise in per household volume consumption, possibly due to increased purchases of lower-cost, higher-volume, lower-alcohol content beverages. This initial increase is supported by the significant interaction coefficient of 4.1 in Table 1, column 3 ($p < 0.05$), representing a 4 % increase relative to the sample mean for total AWP volume in social class E. Some age groups, like those aged 45 to 54, appeared unaffected by the policy, indicating short-term price insensitivity. This may be attributed to lifelong habits and preferences, leading this age group to maintain their cider consumption despite higher prices. Examining longer-term adjustments in purchases and consumption habits is crucial for ensuring the sustained impact of the MUP on drinkers. While some evidence contrasts with qualitative studies suggesting a shift to spirits,[12] the overall findings align with quantitative literature, such as Livingston et al.[18] and Bokhari et al.,[19] indicating declines in alcohol purchases, particularly for cider and spirits. The findings of Anderson et al.[17] align with those of the present study, both showing that price increases led to decreased alcohol purchases, with no rise in spending observed among low-income purchasing

groups. The study emphasised the significance of assessing short and long-term impacts and considering potential shifts in consumer behaviour.

However, limitations include the potential for cross-border purchasing, while Scottish evaluation studies suggest that this factor had minimal impact,[21] it is noteworthy that a larger proportion of the Welsh population resides near the border.[2] Our findings suggest that this greater potential for cross-border purchases has not prevented MUP from reducing overall alcohol sales in Wales. Future research could explore cross border purchases by collecting detailed individual or household-level purchasing data, including source of purchases from consumers on both sides of the border. Investigating actual and modelled health outcomes, productivity losses, crime, antisocial behaviour, and the overall economic impact on Wales would contribute valuable insights for future policy decisions. Future work with a more comprehensive dataset could also calculate cross-price elasticities and better assess the public health impacts of shifts in alcohol purchases. We report results as statistically significant where $p < 0.05$, hence we have not corrected for multiple analyses (e.g. Bonferroni correction). The analysis is also limited by using average price per litre of beverage instead of litres of ethanol, a more direct measure of the policy's impact, which was unavailable. Affordability and income trends, though not directly addressed in this study, are also highlighted as important areas for future research to explore their potential role in shaping the impact of policy interventions.

The study concludes that the MUP in Wales has successfully reduced alcohol purchases and consumption of high-strength alcohol, in a way that is consistent with what we would expect, with the biggest impacts on products such as cider that are bought disproportionately by heavier drinkers. The findings suggest potential applicability of a similar policy for products with analogous issues, such as certain high-sugar foods. Continued assessment for potential cross-product substitutions is crucial for ensuring desired health effects and informing policy adjustments.

Author statements

Ethical approval

As this paper did not involve any contact with individuals and used routinely collected purchasing data, ethics committee approval was not sought.

Funding

None.

Competing interests

Brendan Collins worked for Welsh Government for some of the time during which this study was undertaken. Policy makers in Welsh Government had no input into this study and it was carried out independently.

Author contributions

SB analysed the data and wrote up the results with some support from BC, CA, and BC contributed to writing the manuscript.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.puhe.2024.12.051.

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