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Original Research

A framework for assessing the potential for a double dividend from a policy-induced reduction in alcohol consumption on the economy

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ABSTRACT

Objectives: Tax policies targeted at reducing alcohol consumption are typically understood to be associated with economic losses, including in alcohol production and trade sectors. This study sought to determine whether the overall effect of reduced alcohol consumption might be positive once improvements in productivity associated with reduced alcohol-related consumption are considered.
Study design: This study used Computable General Equilibrium economic modelling.
Methods: An economic modelling framework was developed for Scotland, which considered the fiscal and economic impacts of alcohol taxation and the economy-wide impacts. Simulation of hypothetical alcohol taxes and improvements in labour productivity calibrated on losses due to absenteeism and presenteeism in Scotland in 2017.
Results: The long-run impacts of a five pence increase in taxation alone produce negative economic impacts on jobs and Gross Domestic Product in Scotland (1189 jobs and £71.12 million). These effects are reduced by half – but remain negative – when the revenues from such policy are recycled to the economy through government spending. A small improvement in labour productivity – equivalent to 4.95% of the total productivity gap from absenteeism and presenteeism estimated for Scotland – would be sufficient to turn the economic consequence non-negative.
Conclusions: The overall macroeconomic impact of policies targeted at alcohol consumption should include consideration of the potential productivity effect and that impact studies that do not include such mechanisms are likely to overstate the negative economic impacts of alcohol policies.
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Introduction

Despite efforts to combat excessive drinking, the harmful use of alcohol resulted in an estimated three million global deaths (5.3% of all deaths) in 2016.[1] In the United Kingdom, there were more than 8900 deaths in 2020 related to alcohol-specific causes, higher than in any other year since 2001.[2] Excessive alcohol consumption is also correlated with poor health outcomes, including an increased risk of some cancers and diabetes[3,4] as well as wider social harms.[5–10]

Raising the price of alcohol either through taxes or a minimum unit price (MUP) is seen as an effective public health response.[11,12] However, a pushback against these policies has been the potentially negative impact they could have on jobs and economic activity. Industry-sponsored 'economic impact studies' often show the contribution alcohol makes to the economy, both directly – in drinks manufacturing and the on/off trade sectors – and indirectly through supply-chain multiplier effects.[13–17] Policymakers are, therefore, presented with an apparent trade-off between improved health outcomes and worse economic consequences.

Such studies, however, typically focus on 'gross' economic impacts, that is, the contribution of (or loss of jobs from higher prices in) the alcohol industry itself. Some new research has, however, attempted to use the same models to assess the 'net' impacts of alcohol policy, which also accounts for the potential positive impacts on other sectors from demand shifting to non-alcohol products in response to relative price changes. Wada et al.[18] and Connolly et al.[19] show that the macroeconomic implications of increasing the price of alcohol may be less negative than first

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thought (and under certain circumstances positive) once this demand-switching is considered.

But even these recent attempts to capture the 'net' effect of demand changes ignore links between reduced alcohol consumption, public health outcomes and the associated macroeconomic benefits. This not only leads to a gap in the assessment of the 'net' economic impact of policy but also means that economic and public health debates on alcohol policy are disconnected.

There is rich evidence exploring the links between excessive alcohol consumption and economic outcomes for individuals.[20–23] But we are unaware of any peer-reviewed study that incorporates the 'supply side' effects from increased productivity from reductions in alcohol consumption into standard macroeconomic frameworks used in policy or by industry whilst also accounting for the negative impact of price policies on industry.

The purpose of this article is to set out a method to do this. To illustrate our framework, we focus on the consequences of improved labour productivity from a reduction in absenteeism and presenteeism expected to take place following a reduction in alcohol consumption.[24,25] Presenteeism reduces productive capacity while being in paid work, whereas absenteeism is the negative impact from taking off paid time from work due to health-related and other problems.[26] This study deals with presenteeism and absenteeism caused directly or indirectly due to alcohol consumption. We provide an illustrative example informed by recent data from Scotland and the United Kingdom.

Our approach – which we illustrate using a macroeconomic model of Scotland – means that we capture not just the impact of demand-switching following an increase in the relative price of alcohol but also any change in productivity when a fiscal intervention on alcohol consumption is introduced.[d] We show that the potential impacts of such productivity effects are large, suggesting that any assessment of the economic costs from increased taxes, or a MUP, ignore a crucial benefit to the economy that will impact any 'net' assessment of outcomes.

Methods

We use an applied macroeconomic model of Scotland (AMOS) – see Lecca et al.[27] for a guide. It is a dynamic forward-looking Computable General Equilibrium model. AMOS has been used to assess a variety of policy issues (including Brexit and studies of the value of higher education, see Figus et al.[28] and Hermannson et al.,[29] respectively).

Computable General Equilibrium models are widely used by policymakers, including national governments and international organisations such as HM Treasury and the World Bank. A variant of AMOS is used by the Scottish Government for policy development.[30] They are quantitative models designed to evaluate the impact of policy shocks in a country or region. They begin by emulating the structure of that economy and the interactions and dependencies among various agents (e.g. households, firms, the government, etc.; see Fig. 1). A change in the level of alcohol consumed by households due to a higher tax would ripple through the economy through various channels, thus having macroeconomic impacts.

The key elements of AMOS used here are provided in Lisenkova et al.[33] with a full listing in Emonts-Holley et al.[34] The economy is assumed to be in equilibrium before the introduction of "shocks" (in this case, sequentially, an excise duty on alcohol and a labour

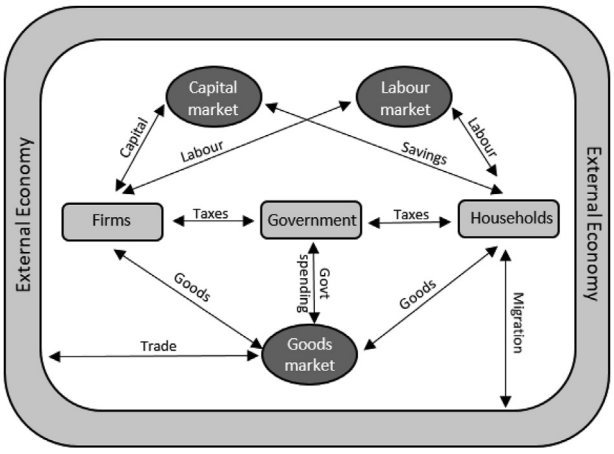

Fig. 1. Interactions among the agents within the AMOS model.

productivity increase) so that economy-wide changes can be attributed to the shocks introduced. Fig. 1 shows how the model captures the relationships between production and consumption across the economy and so can be used to simulate how the economy responds under specific assumptions. In the short run, sectoral capital stocks are assumed to be fixed but in the long run adjust to their desired levels through changes in investment. In the short run, the stock of labour force is also fixed so that employment adjusts through increasing the employment rate. However, unlike capital, in the short run, labour can move freely between sectors. Migration into Scotland (or out) is also possible and responds to differences in real wages and unemployment between Scotland and the (exogenous) rest of the UK economy. The effect of these dynamics is that changes from shocks take time to fully materialise, but a long-run equilibrium reflects where all markets have fully adjusted to the change in policy. We concentrate on the long-run equilibria.

The model is calibrated on real economic data, in our case, a 2016 Social Accounting Matrix database for Scotland developed from the Input-Output tables produced by the Scottish Government. For our purposes, we aggregate to 14 sectors (which are listed in Appendix 1) to focus on the appropriate sectors affected directly and indirectly. We introduce three shocks, which are summarised in Fig. 2. In this figure, text in a diamond indicates the disturbances introduced in each simulation, whereas text in rectangles indicates the key consequences, which are determined endogenous in our modelling framework.

The first shock is an illustration of the economic impacts of an increase in alcohol tax. We assume a rise of five pence in all alcohol taxes, which raises prices paid by domestic households and so reduces demand (Fig. 2, row 1). We show how our results are affected by the use by government of these additional tax revenues in the second shock (Fig. 2, row 2). The third is a change in the supply side of the economy – modelled as an improvement in labour productivity – from the elimination of current days lost each year from absence and presenteeism at work from alcohol consumption (Fig. 2, row 3).[e]

To capture the economy-wide impact of these effects, we make use of the methodology by the Scottish Government (2010).[35] Workers are estimated to turn up at work with the negative effects of excessive alcohol consumption, on average, two and a half

[d] Scotland is an interesting case study because of the policy interest in reducing alcohol consumption and the importance of the industry for investment, jobs and exports.[31,32]

[e] Note these improvements do not consider other avenues through which productivity might be impacted, for example, reinvesting savings in health expenditures in pro-growth policies.

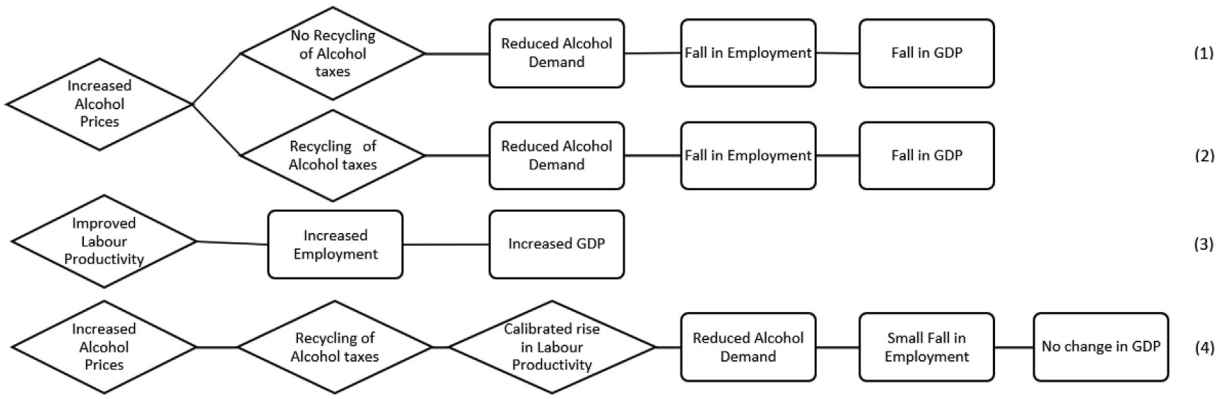

Fig. 2. Shocks introduced into the Computable General Equilibrium model.

days per year, with an efficiency hit of 27% compared with normal days. In effect, the output from 0.68 full working days was lost per employee annually due to presenteeism.[36] For absenteeism, it is estimated that an average of 4.4 days were lost per worker in the United Kingdom each year.[37] A study by Leontaridi[38] showed that 6%–15% of all sick days can be attributable to alcohol-related sickness in the United Kingdom. The midpoint of this range (10.5% of 4.4 days) is used here as an illustration of the sick days lost each year from excessive alcohol consumption. To note, these specific scenarios are simply to illustrate the value of such a modelling framework: specific empirical data on pricing and productivity losses, if available, could be used instead.

Finally, we model the impact if such presenteeism and absenteeism productivity losses from excessive consumption were to be eliminated. Based on these data and assumptions, we estimate that eliminating these losses would be equivalent to 0.493% improvement in national labour productivity.

Results

We first look at the impact of an increase in alcohol taxes. Table 1 summarises the estimated long-run economic impacts of a five pence increase in tax applied to all alcohol products sold in Scotland. We show the impact that this has across a range of economic variables, including Gross Domestic Product (GDP), employment, real wages and output.

In line with the first shock outlined in Section Methods previously, column 1 in Table 1 assumes any taxation raised by the government is saved. In other words, the 'gross' impacts of a policy to increase alcohol tax. This is implicitly the assumption underpinning industry-led 'economic impact' assessments. The increase in tax leads to a reduction in alcohol purchased. Unsurprisingly, the effects on the economy are all negative. The impacts, whilst small in percentage terms, are not insignificant. For example, the −0.05% hit to employment equates to a loss of jobs of 1189 FTE in the Scottish economy. GDP is smaller by 0.058%, or £71.12 million. Household consumption falls (government consumption remains fixed by assumption), and net trade deteriorates through a loss in competitiveness (in part, from the increase in after-tax prices).

Column 2 illustrates the estimated economic impact when the additional alcohol tax revenues raised are recycled through higher government spending. The 'net' impact is still negative, but the effects are reduced, often by around 50%. For example, the fall in employment, in the long run, is reduced to −0.030% or 686 jobs. The fall in GDP is reduced by a similar magnitude to −0.033%, a loss of £41.61 million. Household consumption continues to fall, but by less, whereas government spending rises by 0.002%. The 'net' negative impacts reflect, in part, the importance of the industry to Scotland's economy, particularly exports.

We next look at the impact from eliminating absenteeism and presenteeism losses from labour productivity resulting from the consumption of alcohol in Table 2.

Unsurprisingly, with a more productive workforce, we see a boost to economic activity, equivalent to 0.675% of Scottish GDP, or £839.95 million. Employment would rise by 0.211%, or by 4838 FTE. One way of interpreting this is to say that Scottish GDP is currently over 0.67% lower than would otherwise be the case if the labour supply effects of excessive alcohol consumption were eliminated.

Discussion

The estimates mentioned earlier reveal the different – and often conflicting – impacts on the economy of changes in alcohol policy, notably to increase in the price of alcohol. Crucially, these findings

Table 1
Economic impact of a 5p increase in alcohol taxes on the Scottish economy, % changes from base in long run.

Variable	(1)	(2)
GDP	−0.058%	−0.033%
Employment	−0.052%	−0.030%
Output	−0.051%	−0.030%
Household consumption	−0.032%	−0.019%
Investment	−0.045%	−0.026%
Government spending	0.000%	0.002%
Exports	−0.043%	−0.025%
Imports	−0.018%	−0.010%
Real wages	0.000%	0.000%
Consumer price index	0.048%	0.028%

Table 2
Economic impact of the elimination of costs to the economy from alcohol-induced absenteeism and presenteeism, % changes from base in long run.

Variable	(3)
GDP	0.675%
Employment	0.211%
Output	0.629%
Household consumption	0.165%
Investment	0.547%
Government spending	0.666%
Exports	0.686%
Imports	0.066%
Real wages	0.000%
Consumer price index	−0.265%

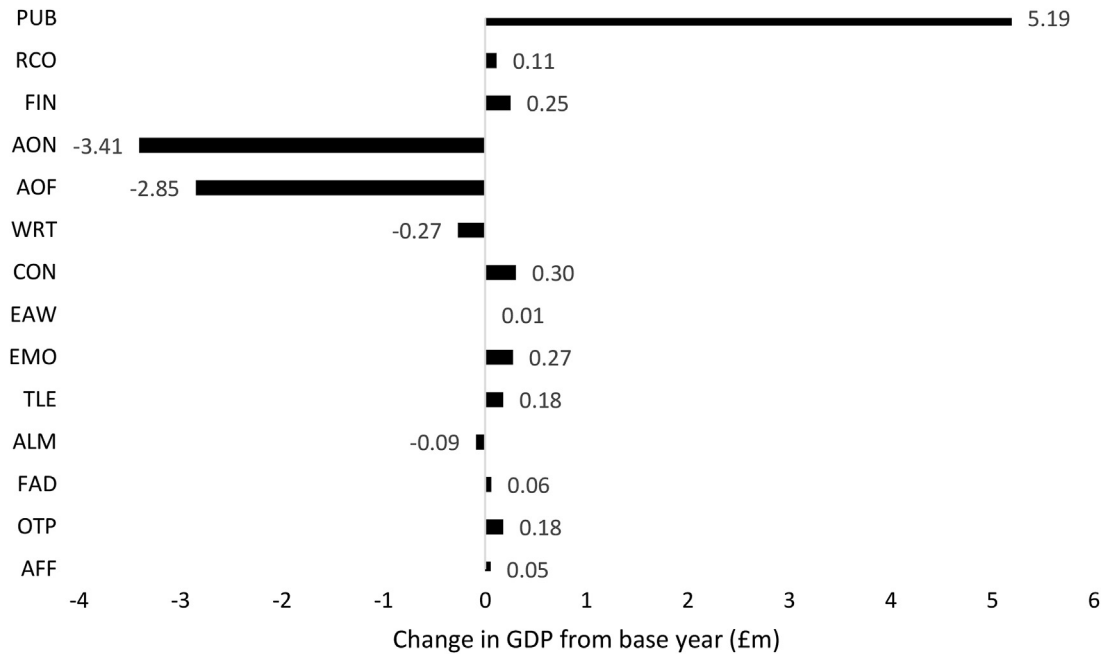

Fig. 3. Net GDP impact by sector from 5p increase in alcohol tax, recycled government revenue and improvement in productivity from a reduction in alcohol-associated labour market outcomes.

are more complex than in industry-led impact studies and are used to highlight the risk of taxes or MUP.

First, we do find that an increase in taxes, with the subsequent revenues saved by the government, leads to a loss in economic activity and employment (Column 1, Table 1).

Second, however, a significant amount of that negative loss is ameliorated when revenues raised are recycled back into the economy (Column 2, Table 1). The net effect, however, in an economy such as Scotland, with a large alcohol manufacturing and successful on- and off-trade sector, is still negative. A trade-off between economic impacts and alcohol consumption for policymakers would appear to exist.

But third, we show that the economy would benefit greatly from an improvement in productivity from a reduction of absenteeism and presenteeism in the workforce. Increases in the price of alcohol, if successful in reducing alcohol-induced illness amongst workers, could be expected to produce benefits from higher productivity. We show that these effects could be significant. Clearly, the 'overall' impact depends on how rates of absenteeism and presenteeism respond to any given change in tax, and this is an important area of further research. Our final contribution, however, is to demonstrate that the net reduction in Table 1 – both to employment and GDP – will definitely be reduced (and could be positive) once recognition is given to productivity channels through which public health will be improved (Fig. 2, Row 4). In our example, an improvement in national labour productivity of just 0.024% – equivalent to around 4.95% of the total productivity gap originating from absenteeism and presenteeism would be sufficient to ensure that the overall impact on Scottish GDP from a five pence increase in alcohol taxes would be zero.

Note that in this case, we still find a negative impact on economic activity in sectors tied to the alcohol industry. Fig. 3 shows the net sectoral impact of a five pence increase in alcohol taxes and a productivity improvement sufficient to ensure that the net impact on the economy (as measured by GDP) as a whole is zero.

Although this simulation constrains the overall change in GDP to be zero, economic activity does fall across the on- and off-trade sectors (AON & AOF), and there is a slight fall in alcohol manufacturing (ALM) too. The smaller fall reflects the export-intensive nature of these sectors. But note the increases in most other sectors of the economy. Increased government spending boosts activity in the public sector for example. But there is also demand-switching benefitting other sectors too. In short, there is a realignment of activity within the economy.

In summary, our contribution is to analytically demonstrate, using frameworks common for policymakers and industry bodies, that assessing the impact of changes in alcohol policy on economic outcomes must look beyond simply the gross impacts on the industry itself. Whilst the impacts on the industry of price policies are likely to be negative, positive boosts to the rest of the economy through recycled tax revenues and greater productivity make the total effect of such a policy ambiguous. Indeed, if a relatively small share of the productivity improvements can be secured, the impact – even in Scotland with a large alcohol sector – is likely to be positive.

Conclusions

Health concerns have prompted governments to seek to reduce excessive alcohol consumption. Whilst widely supported to improve public health, it is frequently argued that reducing the sale of alcohol products will have a detrimental economic impact. This concern is understandable, given the importance of manufacturing and on- and off-trade for jobs and investment. This is particularly true in Scotland.

Unfortunately, debates over the health harms of alcohol consumption and the economic benefits from industry take place in parallel to each other. Public health officials typically focus on human and societal costs, whereas economists build macroeconomic models that capture links between GDP and jobs.

In this article, we have outlined a framework that seeks to bring these different agendas together. Our macroeconomic framework can capture not just the impacts of reduced demand on the alcohol industry from higher prices but also the impacts of recycling tax

revenues and improvements in productivity from better public health outcomes. This provides a systematic framework with which to better understand the full effects of changes in tax policies.

Our results confirm that an increase in alcohol taxation alone, without considering any other effect, would have negative effects on the Scottish economy. This broadly captures the approach of conventional 'impact studies'.

However, it is the 'overall' impact that matters for the macroeconomic consequences. Our key takeaway is that the assumption that increasing alcohol taxes is unambiguously bad for the economy and therefore that a trade-off exists between health and the economy does not necessarily hold. Indeed, our study shows that once consideration is given to further channels (labour productivity), then claims over significant aggregate job losses are likely to be overblown.

Future research could look to develop microeconomic evidence on how specific percentage changes in taxes feed through to levels of absenteeism and presentism. These could be incorporated into specific point estimates for the likely productivity boost from a given change in tax. In this article, we have focussed on one aspect of productivity – attendance at work – and it is entirely possible to extend this to other areas. Such an analysis is likely to reveal higher level 'dividends' of policies directed at moderating harmful alcohol consumption.

Author statements

Ethical approval

None sought.

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Competing interests

None declared.

Appendix 1. Sectoral aggregation of the Social Accounting Matrix for Computable General Equilibrium modelling

Sector	Description	SIC classification (2007)
AFF	Agriculture, forestry and fishing	1-3
OTP	Other primaries	5-9, 19-21
FAD	Food and drink	10,11.07,12
ALM	Alcohol manufacturing	11.01-06
TLE	Textiles, leather, wood, rubber, cement and glass	13-18, 22-25
EMO	Electrical, mechanical and other manufacturing	26-33
EAW	Electricity and water	35-39
CON	Construction	41-43
WRT	Wholesale and retail trade, transportation	45-56
AOF	Alcohol Off-trade	46 – Alcohol
AON	Alcohol On-trade	55, 56 – Alcohol
FIN	Financial services	64-66, 69.2-70, 73, 74, 82
RCO	Real Estate, communication and other services	58-63, 68-69.1, 71, 72, 75-81, 90-97
PUB	Public services including education and healthcare	84-88

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