

Rapid evidence review: Strengths and limitations of tobacco taxation and pricing strategies

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About this briefing

This rapid evidence review summarises recent literature on the strengths and limitations of specific tobacco taxation and pricing strategies.

Key points

- Increasing tobacco prices is widely recognised as the most effective way to reduce smoking rates. Taxation is the most commonly used tobacco control strategy to achieve this, with substantial evidence demonstrating that it has been effective in raising prices, which reduces smoking prevalence and related harms, and slightly narrows socioeconomic inequalities in health.
- However, an emerging body of evidence indicates that the full public health benefit of tobacco taxation is not always reached because this approach is open to industry circumvention. A particularly salient finding is that the real retail prices of the cheapest tobacco products in the UK have barely changed over the past 15 years. In part, this is due to tax increases not being passed on to cheaper tobacco products; rather they tend to be strategically shifted onto premium products. The resulting price differential between cheap and premium tobacco may act to maintain or widen health inequalities.
- Alternative price-based tobacco control strategies could include a
 minimum mark-up of wholesale tobacco prices. While two studies find that
 this approach does not increase average cigarette prices, a further study
 suggests it may be able to increase the cost of cheaper tobacco products.
 However, this approach is also not necessarily immune to circumvention
 and is likely to incur significant administrative burden.
- Three modelling studies indicate that a further approach implementing a minimum legal retail price per stick or pack (minimum floor price) – can

lower smoking prevalence and reduce health inequalities. However, this approach is relatively untested, with only one observational study identified. As such, little is known about unintended consequences. This approach could also lower government tax revenues that could be used to offset the fiscal impact of tobacco use including healthcare costs and lost productivity.

• Another possible approach involves placing a price cap on tobacco products. This may limit shifting of the tax burden onto premium products, which facilitates the continued sale of cheap tobacco. This approach also stands to be a vehicle through which government revenue on tobacco could be increased. This strategy is, however, relatively untested with the retrieved evidence including only one modelling study and one review focusing on tobacco price cap policies, with no observational studies identified.

Background

Tobacco use represents the leading preventable cause of morbidity and mortality in Scotland, with around 20% of all deaths attributable to smoking. Smoking-related morbidity and mortality are strongly patterned by socioeconomic group in Scotland, with 35% of adults in the most deprived quintile of the Scottish Index of Multiple Deprivation (SIMD) being current smokers, compared to 11% in the least deprived quintile.

The World Health Organization recognises that 'price increases on tobacco products are one of the most effective means of reducing cigarette smoking.'³ A wealth of empirical evidence supports this position.^{4, 5, 6} A meta-analysis of tobacco price elasticity suggests that a price rise of 10% would lead to around 4% reduction in smoking in high-income countries.⁷ In addition, price increases have the potential to reduce health inequalities, as they have a greater impact on quit rates and smoking uptake among those in lower socioeconomic groups.⁸ Price increases also represent an approach that is likely to be particularly

effective among younger people due to increased price sensitivity.^{5, 6} In contrast, the effectiveness of some alternative attempts to reduce tobacco-related harm varies across population groups, which can act to widen health inequalities. For example, mass media campaigns may be more effective among those in higher socioeconomic groups.^{9, 10}

Tobacco prices are most commonly manipulated for public health benefit via taxation, which at present is generally recognised as both the most effective way of increasing price and of reducing smoking rates.^{6, 11} However the ability of taxation to achieve public health improvement may change over time or more effective measures may emerge. Indeed, a recent qualitative study of the views of tobacco control experts concluded that further work is needed to explore tobacco pricing policy in Scotland.¹²

This rapid evidence review, therefore, examines and summarises the relative strengths and limitations of a number of specific tobacco taxation and pricing strategies. The focus of this review is chiefly on the ability of strategies to affect tobacco prices, given the strong evidence linking price with smoking prevalence.^{4, 5, 6, 7} However, a broad range of additional strengths and limitations are considered. This includes smoking rates, smoking-related morbidity and mortality, public perception and the ability to raise tax revenue.

Evidence summary

Systematic review methods were used to identify, critically appraise and synthesise published, peer-reviewed research on tobacco pricing strategies. Of 1,265 articles identified, 17 met the inclusion criteria (protocol available online). This evidence summary is based on those 17 articles, plus five additional key papers which were identified by topic experts or through searching reference lists of retrieved papers. The retrieved articles include one systematic review, two narrative reviews and 19 primary studies, of which four were modelling studies. Three of the studies were based in the UK and four examined evidence from multiple countries. The remainder focused on a single country, and were

predominantly based in the USA (12 articles). Table 1 summarises the strengths and limitations of each of the tobacco pricing policies reviewed here (see Appendix 1).

Taxation strengths

Revenue generation

An advantage of using taxation to control population-level tobacco consumption is that it can raise government revenue which can be spent on services and materials aimed at public health and wellbeing improvement. This includes offsetting the direct healthcare costs and loss of productivity associated with tobacco use, providing smoking cessation services as well as other directly incurred costs such as those linked to fires and littering.

Three of the included articles focused on the ability of tobacco taxation to raise government revenue, with some evidence indicating that the revenue spent on tobacco control efforts can reduce smoking rates below the direct impact of increased prices. For instance, one paper demonstrated that higher US state tobacco taxes were associated with increased provision of tobacco cessation services. A further study found that a 2011 tobacco excise increase in Greece generated an additional €558 million in government revenue over two years, while being associated with a 16% decrease in smoking rate versus the previous year. This study also projected that an additional €2 of tax per pack could raise revenue by €1.2 billion.

Public perception

There is some evidence to suggest that taxation could be perceived positively by the public. One of the retrieved articles¹⁵ explicitly evaluated public perception of tobacco taxation, finding that over 60% of a New York City sample were in favour of increased taxation of cigarettes. This proportion rose to around 80% in favour of increased taxes that were earmarked exclusively for healthcare and tobacco abstinence programmes. It should also be noted, however, that the proportion

favouring increased taxation was dependent on smoking status, with current smokers less likely to have a positive perception of increased tobacco taxes. Despite this, around 60% of smokers were in favour of increasing taxes on tobacco products, where the additional tax revenue would be spent on healthcare programmes.

Taxation limitations

Nine articles explicitly focused on ways in which the intended public health benefit of taxation can be circumvented. 16, 17, 18, 19, 20, 21, 22, 23, 24

Tobacco industry pricing strategies

Two recent studies of UK tobacco sales data^{16, 17} together show that the real price per pack of cheap cigarettes has barely changed in the past two decades despite regular tax increases. The inflation-adjusted average price of the cheapest cigarette packs was around £4.75 in 2001/02¹⁶ and £4.68 in 2015.¹⁷ These analyses indicate that this was achieved by both pack sizes being reduced and by taxation being strategically absorbed (undershifted) rather than being passed on to consumers. This research found that tax increases are initially absorbed by the industry across all price categories, however premium brands are undershifted for a shorter period of time, and gradually become overshifted throughout the tax year (i.e. their price is increased above that imposed by taxation increases). Similar market patterns are observed in New Zealand¹⁹, Europe^{18, 20} and the USA.²¹

The price difference between cheap and expensive cigarettes has widened over time due to this approach. The observed stagnation in the price of cheaper tobacco products impedes the ability for taxation to narrow smoking-related health inequalities. This is because socioeconomically deprived, price-sensitive smokers are more likely to purchase cheaper tobacco products^{25, 26} which are relatively unaffected by tax increases. Rather, increases in tax are differentially

shifted onto consumers of more expensive tobacco products, who are known to be less price sensitive.⁸

This research also shows that overall tobacco sales volumes in the UK are gradually shifting away from high- and mid-priced products and towards the cheapest products available at any given time point. 16, 17, 26 Indeed, since its introduction in 2012, a new subvalue cigarette price tier has seen a consistent increase in sales. Similarly, the UK tobacco market has also seen a relative shift towards the use of hand-rolled tobacco which is substantially cheaper per stick than factory-made cigarettes.

Tax structure

A related subset of the included literature finds that deviation from a straightforward taxation structure allows more opportunities for tobacco prices to be polarised.^{22, 23, 24} This research finds that international variation in tax structure is associated with the extent to which price dispersion is seen. Typically, countries where specific tax (i.e. a fixed rate per stick or gram of tobacco) forms a higher proportion of total tobacco duty tend to be those countries with less price dispersion between value and premium products. Conversely, a more complex tax structure which combines specific with ad valorem taxes (based on a percentage of final retail price) is associated with a greater price gap between product tiers. Ad valorem tax has a particular disadvantage in that it allows manufacturers to reduce prices to maintain sales of low-cost tobacco. While this evidence points to specific excise taxes being the most effective form of tobacco price taxation for reducing tobacco-related harm, this must be indexed to inflation in order to maintain effectiveness over time. Specific excise taxes also do not necessarily eliminate differential shifting of tax increases between product tiers.

Minimum pricing

Minimum pricing is an alternative to taxation approaches, which predominantly influences the lower end of the tobacco market. Nine of the retrieved articles^{27, 28, 29, 30, 31, 32, 33, 34, 35} focused on a form or forms of minimum pricing policy, which broadly are characterised into two main types.

Minimum mark-up

Since the 1940s minimum mark-up laws have been implemented in the USA, with around half of US states currently employing this type of policy. These specify a minimum mark-up (typically on a percentage basis) by which the price of tobacco products must be increased between manufacturers' base cost and wholesale price. While these measures were originally designed to ensure fair competition between manufacturers by preventing price undercutting, they have recently been identified as a public health tool. Five of the retrieved articles focus on such policies, including three studies that empirically assess whether they have increased tobacco prices in the USA.

These three studies yield mixed evidence on the effectiveness of minimum mark-up laws. A 2005 study²⁷ found that average cigarette prices in US states with a minimum mark-up law were approximately equal to prices in states without this legislation. The authors attributed these findings to the possibility for mark-up laws to be circumvented by manufacturer price discounts and promotions. Indeed in New York, the only state to explicitly prohibit these promotional incentives, average prices were slightly higher. A similar 2013 study²⁸ concluded that average cigarette prices in drug and grocery stores were lower in minimum mark-up states. However, this study found that the prohibition of pricing promotions in minimum mark-up laws was not associated with higher prices. These authors instead suggested that their finding of lower prices in minimum mark-up states was due to the level of mark-up being set too low. They also attributed their finding to poor enforcement of, and adherence to, legislation. Indeed, a small qualitative study, conducted as part of their research, found little evidence of proactive enforcement or threat of fines to deter violations.

While these studies focused on average cigarette prices, the price gap between cheap and expensive cigarettes, which is increasingly characterising the tobacco market, means it is particularly important to determine the impact that minimum mark-up legislation has on low-price tobacco products. A more recent empirical study addresses this by focusing on cigarettes sold at the lowest quarter of all prices in the market.²⁹ This study found that US states with a minimum mark-up law in place had prices for cheap cigarettes that were around 5–11% higher than states without such legislation. Further, states that included restrictions on trade discounts and pricing promotions as part of their minimum mark-up laws also had higher prices by an additional 6%.

However, while this study represents some evidence that minimum mark-up policies may be effective in reducing health inequalities, there are some limitations that may undermine their intended public health benefit. Chiefly, as these policies are typically based on a percentage of the manufacturer's cost, they remain open to industry influence.^{30, 31} This, for example, could include reduction of the real or apparent cost of making tobacco products. A further significant limitation is the heavy administrative burden of this type of policy as it is necessary to track the manufacturing cost of all products/variants on the market, which is likely to change over time.

Minimum floor price

An alternative form of minimum pricing involves placing a floor on the price of tobacco products. Unlike minimum mark-up policies, floor pricing is based on the final retail price and establishes a minimum price below which sales are prohibited by law (for example on a per-stick or per-pack basis). While six of the retrieved articles focus on this form of pricing policy^{30, 31, 32, 33, 34, 35} there is comparatively little empirical evidence that evaluates this approach, with only one* instance of real-world implementation identified.³² This study was

* New York City has recently implemented a minimum floor price for cigarettes, however evaluation of this policy is not currently available.

conducted in Malaysia, where a minimum price law was imposed on cigarettes in 2010. Although sales of legal cigarettes below the minimum price reduced following the legislation, this was counteracted by an increase in illicit tobacco sales. The authors suggested this was due to Malaysia sharing long land and sea borders with Indonesia, which has extremely low tobacco prices. This study also found that the floor price is likely to have been set too low, with only 4% of legal tobacco sales being below the minimum before the legislation came into force.

Given the paucity of empirical observations in this area, modelling studies represent a useful way in which the theoretical impact of novel policies can be examined. Price-based tobacco control policies can be modelled with a reasonably high degree of confidence, given the strong evidence linking tobacco price with the elasticity of demand. A further specific advantage to modelling floor-price policies reflects the relative simplicity of this policy approach. Compared with alternative pricing strategies, the effects of floor pricing are likely to be more predictable due to there being fewer opportunities for the tobacco industry to circumvent changes in legislation. Three of the retrieved studies used a modelling approach to predict the impact of minimum floor pricing on tobacco retail cost and smoking prevalence.

One of these modelling studies³³ compared the effect of a cigarette floor price against equivalent excise tax increases, and was based on a large sample of US smokers. While by design both proposed policies had similar effects on average cigarette prices, floor pricing was shown to be more effective in reducing cigarette consumption. This finding was attributed to floor pricing creating a greater relative price increase (i.e. percentage of initial price paid) compared to an equivalent tax, especially among lower income groups. For instance, a floor price set at 125% of the existing average market price (i.e. 125% of average prices across the whole market) was projected to lead to a 30% relative increase in price among lower income groups. An equivalent tax, by comparison, was only

http://legistar.council.nyc.gov/LegislationDetail.aspx?ID=3013584&GUID=2CF281E1-5407-4AB5-8340-E16098EF7F85&Options=ID|Text|&Search=tobacco

associated with a 23% relative increase in price. These results were observed despite the authors allowing a fixed proportion of the sample to continue purchasing cigarettes at their pre-intervention prices to account for illicit trade.

A second modelling study³⁴ estimated the effects of various floor prices, between USD\$0 and USD\$12, on cigarette pack sales in the USA. This study found that even modest floor prices were effective, with a floor of USD\$5 (slightly below the original average price) being projected to lead to a 4% reduction in cigarette sales. As expected, the projected impact increases with the level at which the floor price is set, with a minimum price of around USD\$11 expected to halve cigarette sales. By examining a range of potential floor prices, this approach also revealed that there may be a floor price above which greater impacts of each additional increment were seen. In this study, the critical value was around USD\$5, which is slightly less than the original average pack price. A further strength of this article was that it accounted for tax avoidance according to the prices of tobacco in neighbouring states. Those states with relatively high tobacco prices compared with their immediate neighbours were considered more likely to observe cross-border purchasing. Additionally this model accounted for illicit tobacco imports from and exports to the least expensive or most expensive US states within 1,000 miles, respectively. A related weakness, however, is that international trade was not accounted for.

A third, similar modelling study³⁵ also predicted that the introduction of a USD\$10 per pack floor price could significantly reduce smoking prevalence, particularly when accompanied by legislation to ban price promotions and discounts. The projected effects were especially large among 18–25 year olds, with this intervention estimated to be associated with a 12% decrease in smoking prevalence among this age group.

Overall, this research suggests that floor pricing is a promising strategy, particularly with respect to reducing health inequalities. While these studies point to the potential effectiveness of floor pricing, it is difficult for modelling studies to anticipate unintended consequences that may arise through the use of such a policy. For instance, all of the modelling studies evaluated policies which only

affect the price of factory-made cigarettes. It is possible, however, that the implementation of a cigarette floor price could shift smokers towards alternative tobacco products, such as roll-your-own tobacco.

Furthermore, these studies modelled policies which affected pack prices, meaning they did not account for the tobacco industry taking steps to lower perstick prices by increasing pack sizes. These studies also did not investigate the extent to which government revenue is affected by this type of policy. It is possible that floor pricing could lead to increased industry profits and lower government revenue. This may mean that the industry is better able to fund tobacco marketing strategies, with governments having less available to offset fiscal costs associated with tobacco use.

While from a public health viewpoint, floor pricing has the greatest potential health benefit for low-income, price-sensitive smokers, this approach remains open to the criticism that it is a regressive policy. This means that it could place a disproportionate cost burden on low-income smokers, especially those that find it hard to quit. As such, implementation of this approach should be accompanied by sufficient evidence-based support measures and cessation tools, with a particular focus on people most likely to be affected. A recent review of price-based public health policies also suggested for this reason that government tobacco revenue should be directed towards lower socioeconomic groups more generally – that is, not solely for tobacco-related causes.

Price cap

Placing an upper legal limit on the price of tobacco products represents a further potential tobacco control strategy, however there is a paucity of evidence on this approach, and no examples of real-world implementation identified. Two of the retrieved articles focus on the potential of this approach including a recent systematic review (itself only retrieving four relevant articles) and one modelling study.

The systematic review covering this strategy found that one way a price cap could benefit public health is by limiting the tobacco industry's ability to differentially shift tax between price tiers. This approach could mean that the industry has to increase the price of low-cost tobacco in order to maintain profit levels, thus reducing price dispersion, especially within price tiers. However, a significant limitation with this type of policy is that tobacco manufacturers operate across international markets, meaning it is possible that they could maintain low tobacco prices in one country and offset lost profits on premium products elsewhere. Used in isolation, this approach could also facilitate lower average tobacco prices by reducing price dispersion across the market. Further, while this approach is likely to allow fewer opportunities for downtrading within a specific price tier, it does not prevent consumers of mid-priced tobacco products shifting to a lower price tier.

A second advantage of a tobacco price cap strategy is that it could be paired with tax increases to raise government revenue from tobacco. The retrieved modelling study³⁷ proposed first placing a price cap on manufacturer's wholesale price in the UK, which was projected to substantially reduce industry profitability (by at least £600 million per year). This study then assumed that existing tobacco retail prices would be maintained through increased taxation. This approach essentially involves the government substituting industry profits for tax revenue, with conservative estimates suggesting that this would lead to between £434 million and £586 million per year in additional government income.

While this approach is promising, it has the disadvantage that it does not directly tackle the issue of low-cost tobacco sales. Also, although additional government revenue would be welcome to offset the fiscal burden associated with tobacco use and fund cessation services, a lack of empirical evidence means it is not clear whether this strategy alone (i.e. without necessarily affecting tobacco prices) is sufficient to meaningfully improve public health. A further disadvantage of this approach is that it would require a substantial administrative capacity. Indeed the authors of the modelling study suggest that this approach would require the creation of a regulatory body to ensure that price caps were set appropriately. While the running costs of this new body were accounted for in the

figures cited above, its establishment is likely to incur significant time and financial costs.

UK minimum excise tax

Tobacco pricing in Scotland currently reflects the UK government's tax structure, which uses a mixed specific and ad valorem approach. In May 2017, the UK government introduced a minimum excise tax for cigarettes, which is currently equivalent to £5.60 per pack of 20.38 This pricing policy aims to increase the retail prices of cheap cigarettes and only applies if the typical duty (ad valorem plus specific excise tax) would be below this level, which is not typically true of more expensive products. Although none of the included studies explicitly evaluated minimum excise tax as a tobacco control strategy, the literature summarised above provides insight into the likely advantages and disadvantages of this approach.

The key advantage of a minimum excise approach is that it may help narrow the price gap between cheap and premium cigarettes, which could help reduce health inequalities. However, a significant disadvantage is that this policy does not currently affect other tobacco products. This stands to blunt the public health impact of this measure as smokers could increasingly switch to alternative tobacco products including roll-your-own, which has already seen an increased market share in the past decade.¹⁷

A further disadvantage is that the current UK tobacco tax structure remains open to industry pricing strategies, including differential shifting of taxes between price tiers. The minimum excise level of £5.60 per pack of 20 cigarettes is around £2 lower than the current cheapest retail price of cigarettes in UK supermarkets.³⁹ If the industry is able to sustain lower per-pack profit or economise on manufacture, marketing or distribution costs, then the final retail price of cheap cigarettes may move closer to the minimum excise level. Indeed sales data reveal that the industry is able to sustain extremely low net revenues per pack for subvalue cigarettes (under £0.50).¹⁷ It is also likely that the tobacco industry will

experiment with pack size to maintain sales (above the permitted minimum of 20 cigarettes).⁴⁰

Conclusion

While altering tax structures is not exclusively the Scottish Government's responsibility, the additional tobacco pricing policies reviewed here would fall under its jurisdiction. As such, these additional policies represent some promising means by which Scotland can optimise the potential public health benefits of the existing UK tax structure. This is particularly the case for tobacco floor pricing, which has significant potential to reduce health inequalities by limiting the price strategies used by the tobacco industry to circumvent current public health measures. Floor pricing also has a significant advantage over minimum mark-up and price cap approaches as it is relatively simple to implement and enforce. The main limitation of a floor price approach is that it is relatively untested in real-world settings. Scotland has, however, recently established a legal precedent for utilising minimum price policies, despite similar uncertainties, through its ground-breaking work on alcohol minimum unit pricing. 41, 42

A valuable next step in evaluating this approach would involve replicating modelling studies with Scotland-specific data, to predict the effects of different levels of floor price. This should be based on existing retail prices across the tobacco market, demographically appropriate estimates of elasticity of demand, and should account for potential changes in the prevalence of tax evasion, including illicit trade and legal importation from neighbouring countries for personal use (especially in-person and online sales from England). Modelling the likely Scottish impact should also attempt to account for unintended cognitive and behavioural effects of a minimum price.

About NHS Health Scotland evidence briefings

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Scottish policy link(s)

Scottish Government's Tobacco Control Strategy – Creating a Tobacco-Free Generation (2013–2018) www.gov.scot/Publications/2013/03/3766/

* The highest degree of confidence can be drawn from the review of existing evidence already critically appraised and quality-assured and/or systematic overview and synthesis of existing research evidence from primary and/or review level studies. Protocols for each of these methods have been produced and are available online.

References

¹ The Scottish Public Health Observatory. Smoking attributable deaths in Scotland: trend analysis and breakdown by disease type and age groups; 2003–2014. www.scotpho.org.uk/downloads/scotphoreports/scotpho160621-smoking-attributable-deaths-scotland.pdf (accessed 23 April 2018).

- ³ World Health Organization. Which are the most effective and cost-effective interventions for tobacco control? www.euro.who.int/__data/assets/pdf_file/0004/74722/E82993.pdf (accessed 23 April 2018).
- ⁴ Chaloupka F. Curbing the epidemic: governments and the economics of tobacco control. *Tobacco Control* 1999; 8:196–201.
- ⁵ International Agency for Research on Cancer (IARC). Effectiveness of tax and price policies for tobacco control: IARC handbook of cancer prevention volume 14. www.iarc.fr/en/publications/pdfs-online/prev/handbook14/index.php (accessed 23 April 2018).
- ⁶ US Department of Health & Human Services: National Institutes of Health, National Cancer Institute. The economics of tobacco and tobacco control. https://cancercontrol.cancer.gov/brp/tcrb/monographs/21/docs/m21_complete.pd f (accessed 23 April 2018).
- ⁷ Gallet C and List J. Cigarette demand: a meta-analysis of elasticities. *Health Economics* 2003; 12(10):821–835.

² The Scottish Government. Scottish Health Survey 2016: Volume 1: Main Report www.gov.scot/Publications/2017/10/2970 (accessed 23 April 2018).

⁸ Hill S, Amos A, Clifford D and Platt S. Impact of tobacco control interventions on socioeconomic inequalities in smoking: review of the evidence. *Tobacco Control* 2014; 23:e89–e97.

- ⁹ Durkin S, Brennan E and Wakefield M. Mass media campaigns to promote smoking cessation among adults: an integrative review. *Tobacco Control* 2012; 21:127–138.
- ¹⁰ Beeston C, McCartney G, Ford J et al. Health inequalities policy review for the Scottish Ministerial Task Force on Health Inequalities. Edinburgh: NHS Health Scotland; 2014. www.healthscotland.scot/media/1538/health-inequalities-policy-review-march-2014-english.pdf (accessed 23 April 2018).
- ¹¹ Chaloupka F, Yurekli A and Fong G. Tobacco taxes as a tobacco control strategy. *Tobacco Control* 2012; 21:172–180.
- ¹² Laird Y, McAteer J, Myers F and Reid G. Tobacco control policy in Scotland: A qualitative study of expert views on successes, challenges and future actions. Edinburgh: NHS Health Scotland; 2017.
 www.healthscotland.scot/media/1627/tobacco-control-policy-in-scotland-a-qualitative-study.pdf (accessed 23 April 2018).
- ¹³ Abraham A, Bagwell-Adams G and Jayawardhana J. Availability of tobacco cessation services in substance use disorder treatment programs: impact of state tobacco control policy. *Addictive Behaviors* 2017; 71:12–17.
- ¹⁴ Alpert H, Vardavas C, Chaloupka F et al. The recent and projected public health and economic benefits of cigarette taxation in Greece. *Tobacco Control* 2014; 23(5):452–454.
- ¹⁵ Farley S, Coady M, Mandel-Ricci J et al. Public opinions on tax and retail-based tobacco control strategies. *Tobacco Control* 2015; 24:e10–e13.

¹⁶ Gilmore A, Tavakoly B, Taylor G and Reed H. Understanding tobacco industry pricing strategy and whether it undermines tobacco tax policy: the example of the UK cigarette market. *Addiction* 2013; 108(7):1317–1326.

- ¹⁷ Hiscock R, Branston R, McNeill A et al. Tobacco industry strategies undermine government tax policy: evidence from commercial data. *Tobacco Control* 2017. http://tobaccocontrol.bmj.com/content/early/2018/03/24/tobaccocontrol-2017-053891 (accessed 23 April 2018).
- ¹⁸ Filippidis F, Laverty A, Hone T et al. Association of cigarette price differentials with infant mortality in 23 European Union countries. *JAMA Pediatrics* 2017; 171(11):1100–1106.
- ¹⁹ Marsh L, Cameron C, Quigg R et al. The impact of an increase in excise tax on the retail price of tobacco in New Zealand. *Tobacco Control* 2016; 25(4):458–463.
- ²⁰ Lopez-Nicolas A, Belen Cobacho M and Fernandez E. The Spanish tobacco tax loopholes and their consequences. *Tobacco Control* 2013; 22(E1):e21.
- ²¹ Ballester L, Auchincloss A, Robinson L and Mayne S. Exploring impacts of taxes and hospitality bans on cigarette prices and smoking prevalence using a large dataset of cigarette prices at stores 2001–2011, USA. *International Journal of Environmental Research and Public Health* 2017; 14(3):e318.
- ²² Chaloupka F, Kostova D and Shang C. Cigarette excise tax structure and cigarette prices: evidence from the global adult tobacco survey and the US national adult tobacco survey. *Nicotine and Tobacco Research* 2014; 16(S1):S3–S9.
- ²³ Shang C, Chaloupka F, Zahra N and Fong G. The distribution of cigarette prices under different tax structures: findings from the international tobacco control policy evaluation (ITC) project. *Tobacco Control* 2014; 23:i23–i29.

²⁴ Shang C, Chaloupka F, Fong G et al. The association between tax structure and cigarette price variability: findings from the ITC Project. *Tobacco Control* 2015; 24:iii88–iii93.

- ²⁵ Licht A, Hyland A, O'Connor R et al. Socio-economic variation in price minimizing behaviors: findings from the international tobacco control (ITC) four country survey. *International Journal of Environmental Research and Public Health* 2011; 8(1):234–252.
- ²⁶ Gilmore A, Tavakoly B, Hiscock R and Taylor G. Smoking patterns in Great Britain: the rise of cheap cigarette brands and roll your own (RYO) tobacco. *Journal of Public Health* 2014; 37(1):78–88.
- ²⁷ Feighery E, Ribisl K, Schleicher N et al. How do minimum cigarette price laws affect cigarette prices at the retail level? *Tobacco Control* 2005; 14:80–85.
- ²⁸ Tynan M, Ribisl K and Loomis B. Impact of minimum price laws on the retail price of cigarettes in the USA. *Tobacco Control* 2013; 22(e1):e78–e85.
- ²⁹ Huang J, Chriqui J, DeLong H et al. Do state minimum markup/price laws work? Evidence from retail scanner data and TUS-CPS. *Tobacco Control* 2016; 25:i52–i59.
- ³⁰ Golden S, Smith M, Feighery E et al. Beyond excise taxes: a systematic review of literature on non-tax policy approaches to raising tobacco product prices. *Tobacco Control* 2016; 25:377–385.
- ³¹ McLaughlin I, Pearson A, Laird-Metke E and Ribisl K. Reducing tobacco use and access through strengthened minimum price laws. *American Journal of Public Health* 2014; 104(10):1844–1850.

- ³² Liber A, Ross H, Omar M and Chaloupka F. The impact of the Malaysian minimum cigarette price law: findings from the ITC Malaysia survey. *Tobacco Control* 2015; 24(3):iii83–iii87.
- ³³ Golden S, Farrelly M, Luke D and Ribisl K. Comparing projected impacts of cigarette floor price and excise tax policies on socioeconomic disparities in smoking. *Tobacco Control* 2016; 25:i60–i66.
- ³⁴ Doogan N, Wewers M and Berman M. The impact of a federal cigarette minimum pack price policy on cigarette use in the USA. *Tobacco Control* 2018; 27:203–208.
- ³⁵ Marynak K, Xu X, Wang X et al. Estimating the impact of raising prices and eliminating discounts on cigarette smoking prevalence in the United States. *Public Health Reports* 2016; 131:536–543.
- ³⁶ Sassi F, Belloni A, Mirelman Am Suhrcke M et al. Equity impacts of price policies to promote healthy behaviours. *The Lancet* 2018. http://dx.doi.org/10.1016/S0140-6736(18)30531-2 (accessed 23 April 2018).
- ³⁷ Branston J and Gilmore A. The case for Ofsmoke: the potential for price cap regulation of tobacco to raise £500 million per year in the UK. *Tobacco Control* 2014; 23(1):45–50.
- ³⁸ HM Revenue and Customs. Excise Duty Tobacco Duty Rates. www.gov.uk/government/publications/rates-and-allowances-excise-duty-tobacco-duty/excise-duty-tobacco-duty-rates (accessed 23 April 2018).
- ³⁹ mySupermarket. www.mysupermarket.co.uk (accessed 23 April 2018).
- ⁴⁰ UK Government. The Standardised Packaging of Tobacco Products Regulations 2015. www.legislation.gov.uk/ukdsi/2015/9780111129876 (accessed 23 April 2018).

⁴¹ The Supreme Court. Scotch Whisky Association and others (Appellants) v The Lord Advocate and another (Respondents) (Scotland).

www.supremecourt.uk/cases/uksc-2017-0025.html (accessed 23 April 2018).

⁴² The Scottish Government. Minimum Unit Pricing of Alcohol – Final Business and Regulatory Impact Assessment. www.gov.scot/Publications/2018/03/4531/0 (accessed 23 April 2018).

Appendix

Table 1: Summary of tobacco pricing policy strengths and limitations

Policy type	Strengths	Limitations
Tax (overarching)	Raises revenue for tobacco cessation/control endeavours. Public is generally supportive of taxes on tobacco products, particularly if the proceeds are earmarked for healthcare purposes. Well-established approach with a wealth of evidence that it has been effective in raising tobacco prices.	A growing body of evidence identifies strategies employed by the tobacco industry which circumvent taxation to maintain low costs of cheap cigarettes. This can act to widen health inequalities. The respective strengths and weaknesses of ad valorem and specific excise taxes (see rows below) necessitate a combined tax structure which adds to administrative complexity. Greater complexity of tax structures is associated with greater tobacco price differentials, which facilitates down trading in response to tax increases.
Ad valorem tax (% of retail price)	Automatically adjusts for inflation.	Sensitive to industry pricing strategies. When used in isolation, it disincentivises the production of high value tobacco products and facilitates the availability

Policy type	Strengths	Limitations
		of low-priced products. Associated with wider gap between high- and low-priced tobacco products.
Specific tax (flat rate per stick/gram of tobacco)	Less susceptible to industry pricing strategies. Associated with narrower gap between tobacco price tiers. For a given level of total excise, tax revenues are greater when specific taxes form the majority of total duty applied.	Must be indexed to inflation in order to remain effective over time. Does not directly address the issue of low-cost tobacco sales.
Minimum markup	Some empirical evidence shows that this approach can raise the price of low-cost cigarettes, particularly if price promotion and trade discounts are prohibited.	Unless paired with appropriate tax structure, this strategy can potentially lead to higher profits for tobacco industry. Heavy administrative burden. This approach is not immune to industry circumvention, which could respond by lowering real or apparent manufacturing costs.
Minimum floor pricing	Allows fewer opportunities for industry circumvention of tobacco control measures than alternative approaches.	Lack of evidence from real-world implementation. Unless paired with appropriate tax structure, it can

Policy type	Strengths	Limitations
	Relatively simple to enforce compared to alternative approaches.	potentially lead to higher profits for tobacco industry.
	Has the potential to significantly reduce health inequalities by targeting low end of tobacco market.	Must be indexed to inflation in order to remain effective over time.
	Can be implemented with minimal impact on average tobacco prices.	
	Scotland has established a precedent for this approach, despite similar uncertainties, with its groundbreaking work on alcohol minimum unit pricing.	
Price cap	Has potential to circumvent industry's differential shifting of taxes.	Potential for industry to offset lost profits on premium products with international sales.
	Can be used to increase government tax revenue.	Does not directly tackle the sale of low-cost tobacco.