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Easier to afford, more likely to be smoked?

Marlboro indices show higher cigarette affordability in the South and East of Europe

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Abstract

Cigarette prices vary widely across Europe and are difficult to compare, not least because of brand availability and income differences. We have developed two indices (Marlboro-Water and Marlboro-Eggs), comparing the price of a well-known brand sold in 34 European countries to that of two widely used consumer goods to provide intuitive estimates of cigarette affordability. Our indices show that cigarettes tend to be most affordable in the South and the East of Europe, where tobacco taxes tend to be lower and smoking rates higher. By expressing the affordability of cigarettes relative to widely used consumer goods, this study aims to shed further light on the well-established links between tobacco taxes, prices and consumption, highlighting the benefits of policies that aim to reduce cigarette affordability.

Keywords: Marlboro indices, cigarette affordability, cigarette taxation

JEL classification: I12, I18

CONTENTS

TABLES AND FIGURES

Easier to afford, more likely to be smoked? Marlboro indices show higher cigarette affordability in the South and East of Europe

1. INTRODUCTION

Smoking is responsible for at least 8m premature deaths worldwide each year from lung cancer, cardiovascular diseases, diabetes and other illnesses (St Claire et al., 2020; WHO, 2024a). In the EU, about one in seven deaths are currently attributable to smoking (Janssen et al., 2021a). Although daily smoking rates have declined to less than a fifth of the EU's adult population (Eurostat, 2023), with years of life lost to smoking also on a downward trajectory (Janssen et al., 2021b), Europe has the second-highest share of smokers in the world and is projected to overtake Asia and reach first place by 2030, with female smoking rates double the global average and declining more slowly than elsewhere (WHO, 2024b).

An additional risk is posed by the advent of novel tobacco products, consumed by up to a third of children aged 13-15 in some EU countries (WHO, 2022). The effects on health of these products are insufficiently clear, and their usage thus remains strongly discouraged (WHO, 2020). Even second-hand smoking has been linked to a series of adverse health outcomes (Filippidis et al., 2017; Hindricks et al., 2021; Yankelevitz et al., 2017). The cumulative global economic cost of direct and second-hand smoking is estimated at about 2% of GDP, as a consequence of premature mortality and morbidity, and it accounts for 6% of all healthcare spending (Goodchild et al., 2018). In the EU, there is evidence that smokers may earn up to 20% less than non-smokers (Bondzie, 2016). Low-income smokers are particularly vulnerable, as they spend higher shares (up to eight times as much) of their income on tobacco products as high-income smokers do (Takada et al., 2022). This can amount to up to a quarter of these smokers' income (Thompson, 2012), increasing the likelihood that they, and their children, will live in poverty (Belvin et al., 2015).

Because of the far-reaching adverse health and economic impacts of tobacco consumption, tobacco control has received increasing attention in policy agendas around the world over the past few decades. The WHO Framework Convention on Tobacco Control (FCTC), adopted by the World Health Assembly in 2003, lists a wide range of tobacco control best practices. To facilitate adoption of these best practices, in 2008 the WHO introduced the MPOWER measures: verbal and graphic health warnings, advertising restrictions, sale restrictions, public smoking bans, and increased taxation. The type, scale and duration of tobacco control policies differ tremendously between countries (Peruga et al., 2021), with smoking rates also varying widely around the globe.

Enshrined in Article 6 of the FCTC, tax increases (and price interventions more broadly) have been widely identified by researchers as the most effective tobacco control measure (Blecher, 2020; Chaloupka et al., 2020; WHO, 2017), and their prioritisation is recommended in leading international guidelines (WHO, 2021).

2. TOBACCO TAX POLICY AND AFFORDABILITY

Although the general importance of tobacco taxes as a tool for controlling tobacco use is receiving growing acceptance among European policy makers, market complexity requires both tax rates and tax design to work together to reduce the affordability of tobacco products – i.e. the extent to which people can purchase them without feeling the pinch. However, while there is considerable consensus around lower affordability of tobacco products as a key tobacco control objective, there is some disagreement on how to best measure cigarette affordability.

The most widely used method is the relative income price (RIP), or the percentage of annual gross domestic product (GDP) per capita required to buy 100 packs of cigarettes (Blecher and van Walbeek, 2004). Tobacco consumption is clearly sensitive to the RIP: one large cross-country study has found that a 10% increase in the RIP of cigarettes led to a 2% decrease in per capita consumption (He et al., 2018). Another common method of measurement uses the average number of minutes of labour (MoL) required to purchase a pack of cigarettes in a given country (Guindon et al., 2002).

Regardless of the methods used, the literature indicates that, despite global efforts, cigarettes in many countries are becoming more affordable. This is especially true in developing countries, where the speed of economic growth – and thus the purchasing power of consumers – has outpaced policy interventions that raise the price of cigarettes (WHO, 2023). Developed countries, where purchasing power has grown less rapidly (from a higher baseline), and where policies are typically stronger, have performed better. However, even there, affordability in recent years has stabilised, at best, and in some cases has increased, owing to the high-inflation economic environment in the aftermath of the COVID-19 pandemic and the Russian invasion of Ukraine. Moreover, countries where cigarettes have become more affordable are also those where changes in consumer income constitute a bigger driver of affordability changes than changes in cigarette prices, indicating significant untapped potential for tax-related policy intervention (Blecher, 2020).

The main reason that cigarette affordability is so sensitive to inflation stems from tobacco tax design. This can take the form of specific taxes (fixed amounts applied to all cigarettes, regardless of price), or ad valorem taxes (levied as a percentage of price), or mixed taxes combining specific and ad valorem components, which are mandatory in the EU. The best practice is to prioritise specific taxes. Ad valorem taxes are less effective at discouraging consumption, because they incentivise substitution to cheaper cigarette brands instead of cessation. However, specific taxes can be eroded by inflation. This weakness can be addressed by increasing the tax rate at regular intervals or by indexing it to inflation (Blecher, 2020). The latter option has been implemented in several non-EU countries, such as Costa Rica, Turkey, the UK and Australia, but has yet to be adopted in the EU.[1]

[1] Hungary will apply automatic inflation adjustment to tobacco excise taxes from 2026.

3. MEASURING CIGARETTE AFFORDABILITY: THE VALUE OF 'MARLBORO INDICES'

Any meaningful measure of affordability must capture both sides of the consumer equation: consumers' purchasing power and the price of cigarettes, each of which varies widely across time and by country. These two broad criteria leave ample room for variation in the exact method for measuring affordability and can result in considerably different policy recommendations.

The results generated by the two methods described in the previous section (RIP and MoL) can be too abstract to be understood by policy makers and the general public, let alone inspire policy action. This limitation can be addressed by comparing the affordability of cigarettes to that of other consumer products, which would also be easier for policy makers and tobacco control advocates to understand (and use). Another advantage of this approach is that it enables comparisons across countries; this is more difficult when using RIP or MoL, the results of which are distorted by differences in the purchasing power between countries.

A well-known example of measuring product affordability across countries is the Big Mac index, compiled at regular intervals by *The Economist*. The index is designed to compare the purchasing power of consumers by capturing the price of a standardised product (a Big Mac hamburger) across a wide range of countries. Public health adaptations of this measure, most notably with regard to cigarettes (Scollo, 1996; Lal and Scollo, 2002), but also other unhealthy products such as alcohol (Institute of Alcohol Studies, 2004; Veseth, 2008) and sugar-sweetened beverages (*The Economist*, 1997), use the Big Mac (or other widely used products) as the reference product to which the product of interest is compared. Currently, the largest price repository is the World Bank's International Comparison Program, which features a wide range of consumer prices from 176 countries (World Bank, 2024).

Inspired by these approaches, we studied the affordability of cigarettes in Europe. We selected the price of Marlboro, an internationally widespread premium tobacco brand, as our indicator of cigarette prices, with the price of bottled still water and eggs as our reference products. Price data on Marlboro cigarettes and the two reference products were collected from Numbeo[2] for 2023-2024. We sought to include a wide range of European countries (including non-EU member states), resulting in a final sample of 34 countries. The two indices were calculated based on the following formulas:

$$I_{M-W} = \frac{Marlboro\ Price\ (pack)}{Water\ Price\ (1.5\ L)}$$

$$I_{M-E} = \frac{Marlboro\ Price\ (pack)}{Egg\ Price\ (pack\ of\ 12)}$$

Although we recognise that any individual products are imperfect indicators of purchasing power, we deemed eggs and bottled water suitable to this exercise for several reasons. First, these products are universally available and constitute essential consumer goods across our country sample. Second, their pricing is primarily determined by market conditions and is relatively unaffected by country-specific policy constraints, with an exception of farming subsidies for egg producers in some countries. Third, their

[2] Numbeo is an international repository of self-reported price data, which are used here as a (broad) indicator of the most commonly encountered prices of the reference products in the countries of interest.

consumption, especially if kept moderate (in the case of eggs), provides numerous health benefits, in stark contrast to tobacco products.

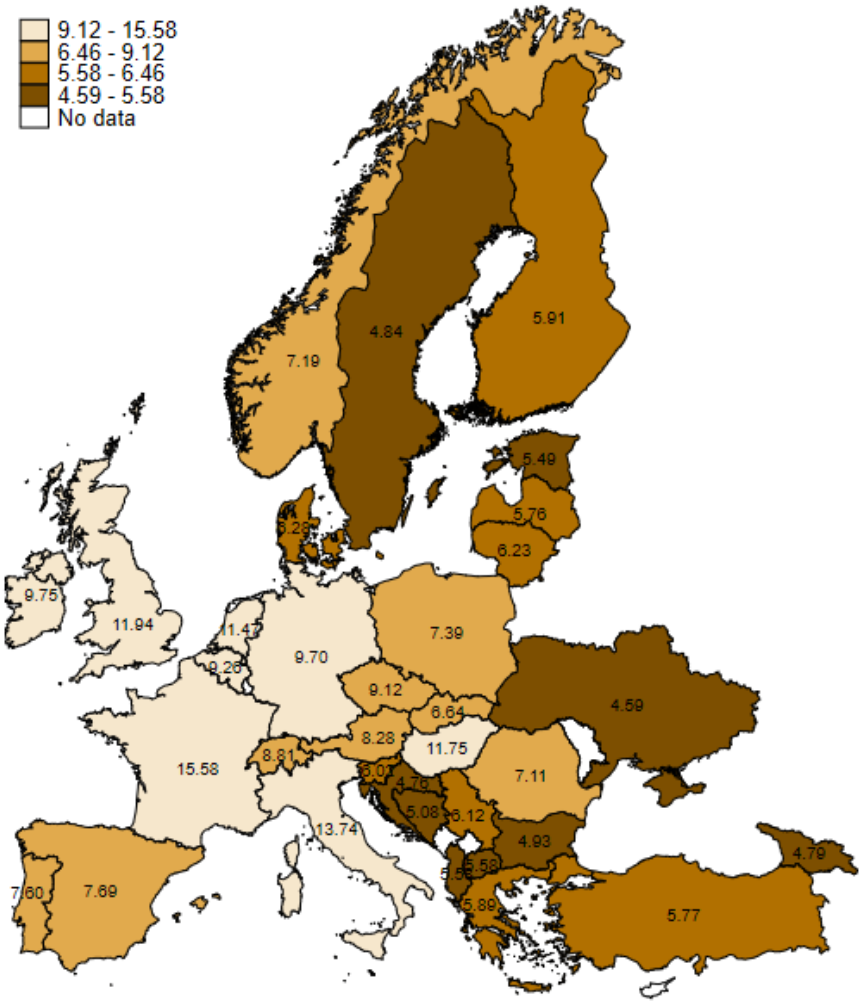
Finally, both eggs and bottled water have been counterposed to tobacco products in the literature as expenditure items that tend to be 'crowded out' by smoking, because their consumption tends to be lower among regular smokers. This suggests that our target and reference products in this study can at least partly be viewed as competitive goods in high- and middle-income countries alike. Expenditure on essential items, including food and beverages, has been found to be negatively associated with smoking, both in comparisons of smokers and non-smokers (Kostakis, 2020; San and Chaloupka, 2016; Vladisavljevic, 2024) as well as in country-level studies before and after tobacco price increases (Jin and Cho, 2021), and positively associated with smoking cessation (Rogers, 2017). Eggs have been specifically referenced as one of the consumption goods for which demand is most heavily affected by smoking (Djutaharta et al., 2021; 2022; Nyagwachi et al., 2020).

4. RESULTS: SMOKERS IN SOUTHEAST EUROPEAN COUNTRIES HAVE THE LOWEST PRICE INCENTIVE TO QUIT

As stated earlier, the value of each index (Figures 1 and 2, below) represents the number of reference products (1.5 L of mid-priced bottled water and a mid-priced pack of 12 eggs in a market) that consumers can buy for the price of a pack of Marlboro cigarettes (20 sticks).[3] A higher value (i.e. a lighter shade in the figures) means less affordable cigarettes. For instance, giving up a pack of Marlboro 'buys' more than 15 bottles of water in France (thus a very good trade-off) but less than five of them in Sweden (a much poorer trade-off), as per our M-W index. Therefore, if one is inclined to consume both bottled water and cigarettes, there is a much stronger temptation to give up the pack of cigarettes in the lighter-coloured countries. Similarly, by purchasing a pack of Marlboro, UK and Irish smokers, whose countries are the best and second-best performers in our M-E index, are 'sacrificing' around four times as many eggs in comparison to smokers in Bulgaria and Albania (the worst and second-worst performers), with cigarettes cheaper than eggs (resulting in an index value below 1) in Bulgaria.

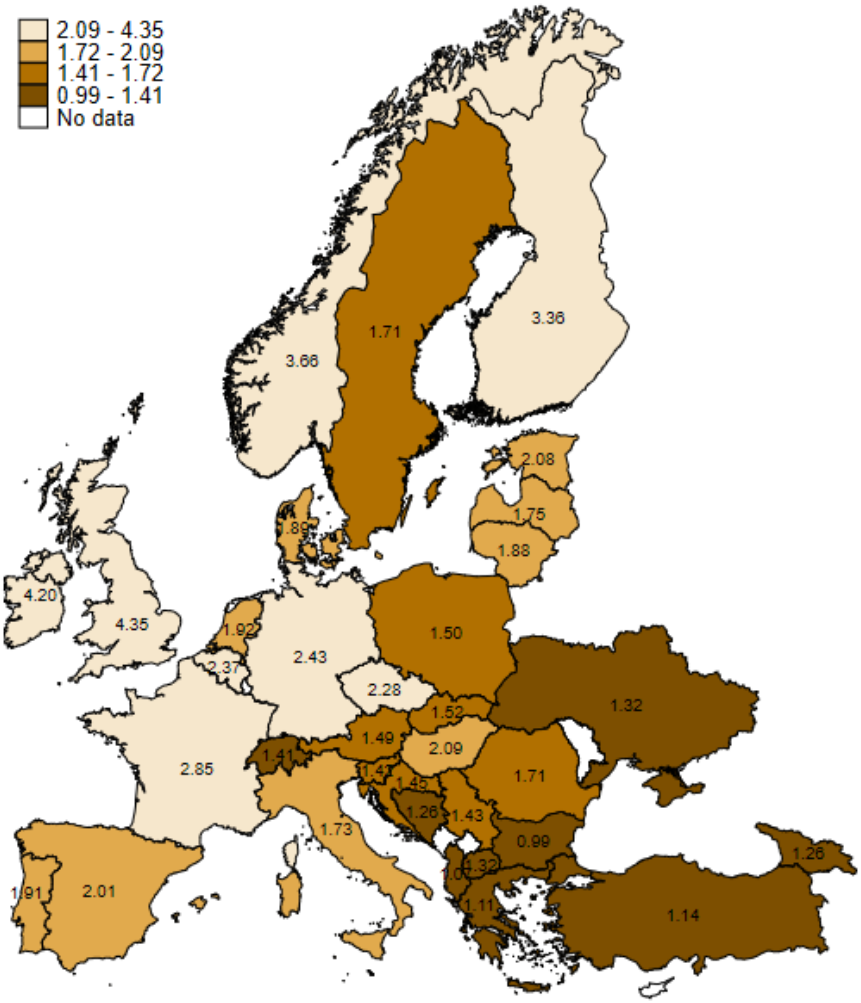
[3] In addition to the relevant figures, all values of the indices are indicated in the Appendix, where we also include the aforementioned Minutes of Labour (MoL) metric as a more standard measure of cigarette affordability. The metric is based on a two-earner couple with two children, both earning 100% of average earnings, with average working hours per week (Eurostat).

Figure 1 / Cigarette affordability in Europe (measured as prices relative to prices of bottled water; Marlboro-Water)



Note: Colours are defined by quartile cut-offs of the Marlboro-Water index (own calculations). ©EuroGeographics for the administrative boundaries.

Figure 2 / Cigarette affordability in Europe (measured as prices relative to prices of eggs; Marlboro-Eggs)

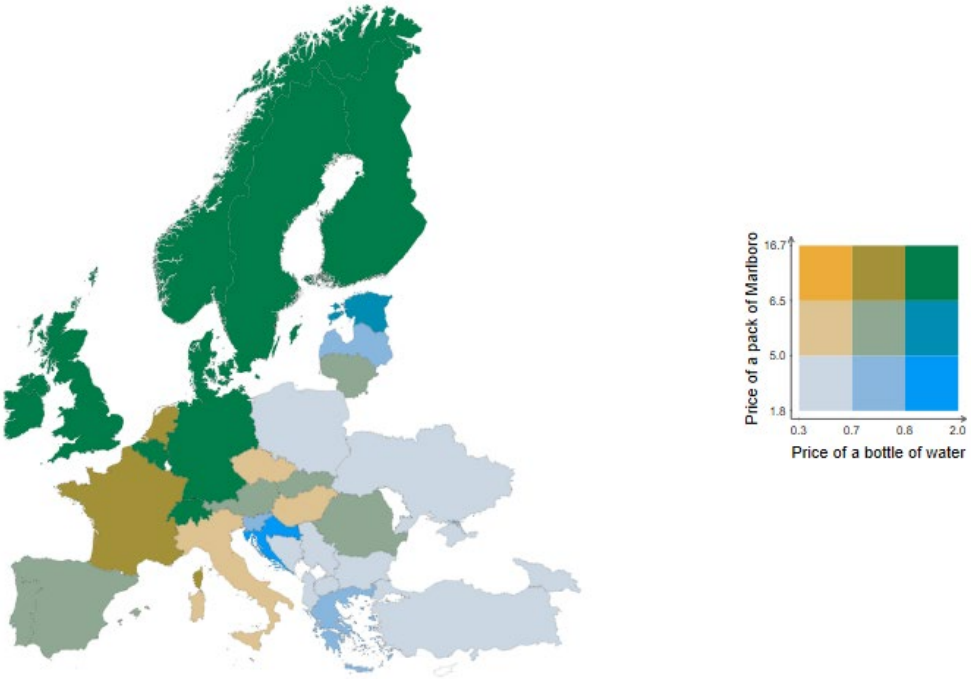


Note: Colours are defined by quartile cut-offs of the Marlboro-Eggs index (own calculations). ©EuroGeographics for the administrative boundaries.

In both indices, the top eight performers in terms of low affordability of Marlboro (in comparison to the reference product) are West European countries (with Belgium, France, Germany, Ireland, and the UK featuring as top performers in both indices, albeit in different positions) and at least six of the eight bottom performers (seven for the Marlboro-Water index) are post-socialist East and Southeast European countries. The three most notable exceptions to the regional pattern are Czechia and Hungary (performing well above average in both indices) and Sweden (performing well below average in both indices). Southeast European countries perform particularly poorly, as Albania, Bosnia and Herzegovina, Bulgaria, North Macedonia, and Serbia are all firmly in the bottom half in both indices.

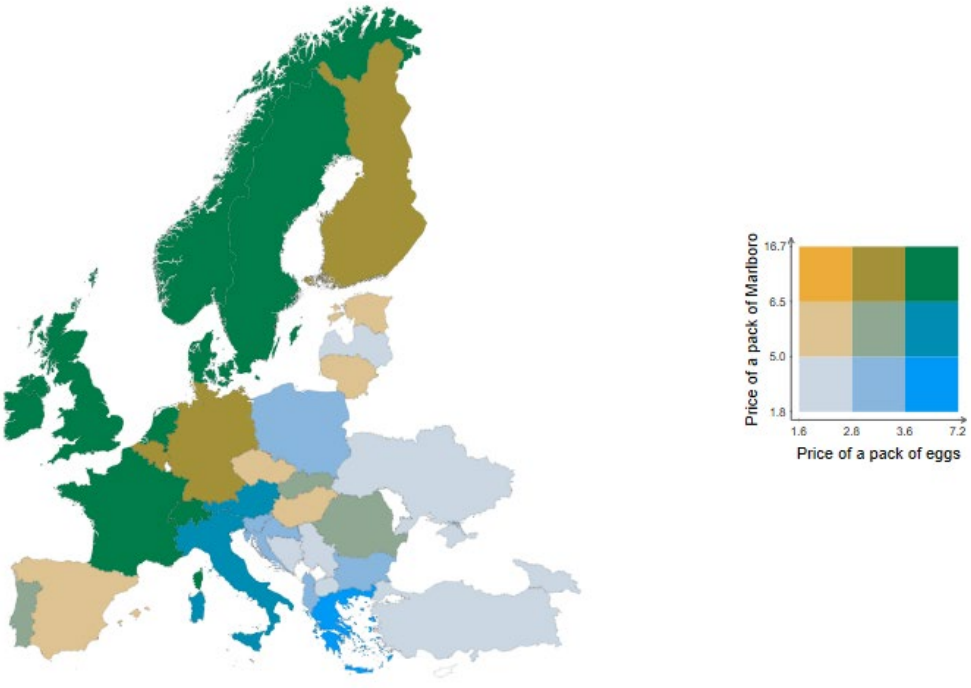
A similar picture emerges from a component-specific glimpse into the index (Figures 3 and 4), which illustrates the extent to which the index values are driven by the price of cigarettes, as opposed to the price of the reference products. Countries with low cigarette affordability (either in absolute terms or relative to the reference product), i.e. the green- and orange-shaded areas in the figure, tend to be concentrated in (North)Western Europe.

Figure 3 / Relative contribution of Marlboro and bottled water prices to the M-W index



Note: Colours are defined by tercile cut-offs of prices (USD; source: Numbeo, 2023-2024). The map was prepared using the Stata package 'bimap' version 2.3 (Naqvi, 2025). ©EuroGeographics for the administrative boundaries.

Figure 4 / Relative contribution of Marlboro and egg prices to the M-E index



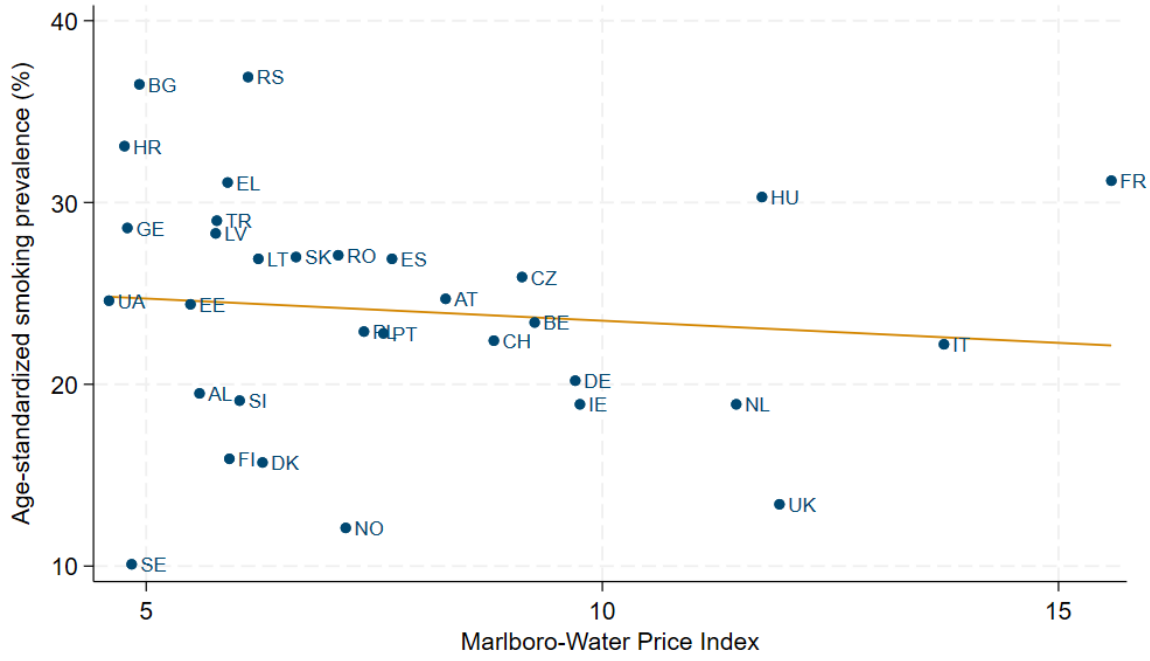
Note: Colours are defined by tercile cut-offs of prices (USD; source: Numbeo, 2023-2024). The map was prepared using the Stata package 'bimap' version 2.3 (Naqvi, 2025). ©EuroGeographics for the administrative boundaries.

5. DISCUSSION: EASIER TO AFFORD, MORE LIKELY TO BE CONSUMED – AFFORDABILITY TENDS TO GO HAND IN HAND WITH TOBACCO TAXATION AND PREVALENCE

In terms of interpreting the results, it is probably no coincidence that some of the worst performers in our two indices – Bulgaria, Croatia, Greece and Turkey – also have some of the highest rates of smoking prevalence on the continent (Figures 5 and 6). Conversely, our top performers (the UK and Ireland for the M-W index and Finland, Norway, the Uk and Ireland for the M-E index) find themselves in the bottom quadrants, as they also exhibit some of the lowest smoking rates in Europe. The only major outlier is Sweden, whose prevalence is the lowest in Europe despite its below-average performance in our index, possibly a consequence of its cultural norms, its much higher use of smokeless tobacco, and other (non-price) tobacco control interventions.

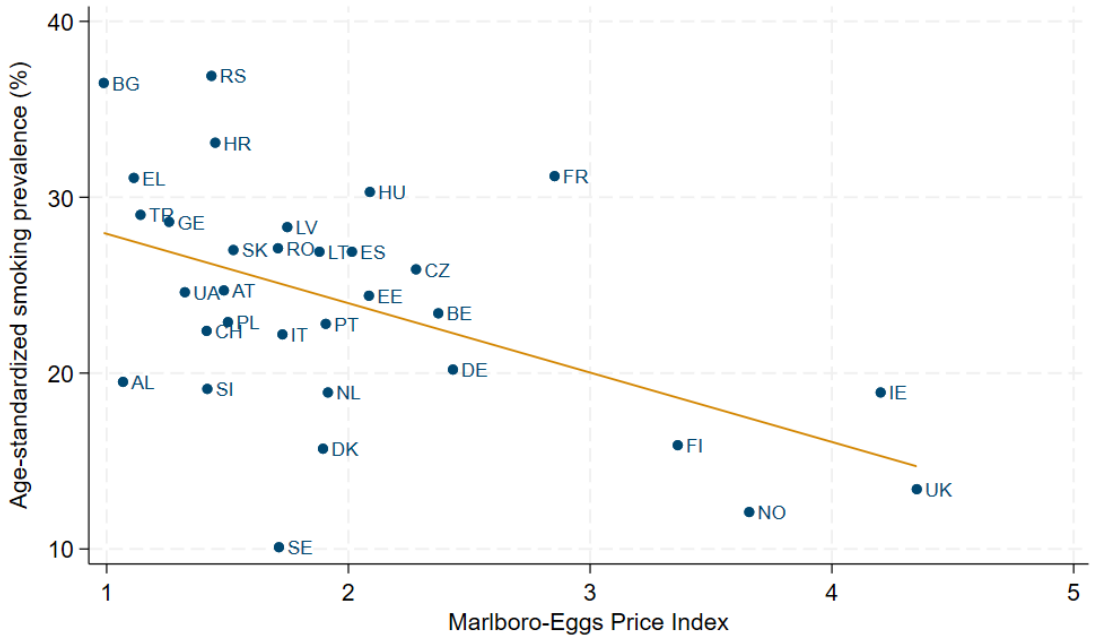
A similar pattern emerges from a comparison of our indices with tobacco taxation rates (Figures 7 and 8). The three countries that levy the highest taxes on cigarettes in Europe – Ireland, the UK and France – are also among the six (top-performing) countries in both of our indices that exhibit the lowest affordability of cigarettes. Conversely, low-tax and high-affordability Southeast European countries tend to cluster in the bottom left quadrant in both figures. The (somewhat rare) outliers in the sample – i.e. countries with relatively low affordability despite their relatively low taxes (Italy in Figure 7 and Norway in Figure 8) – are probably attributable to country-level peculiarities beyond the scope of our research design (e.g. differences in tax pass-through rates and broader pricing strategies by tobacco companies).

Figure 5 / The relationship between cigarette affordability (M-W) and prevalence in Europe



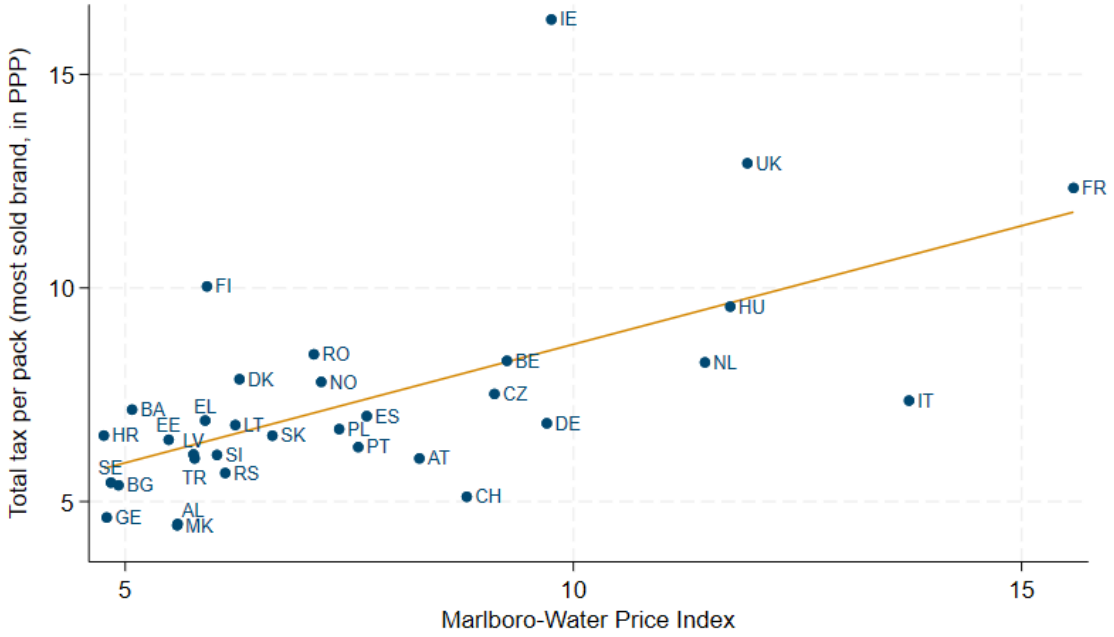
Source: Marlboro-Water Price Index is calculated based on price data retrieved from Numbeo for the period 2023-2024. Age-standardised current smoking prevalence is from WHO (2020).

Figure 6 / The relationship between cigarette affordability (M-E) and age-standardised prevalence in Europe



Source: Marlboro-Eggs Price Index is calculated based on price data retrieved from Numbeo for the period 2023-2024. Age-standardised current cigarette smoking prevalence is from WHO (2020).

Figure 7 / The relationship between cigarette affordability (M-W) and taxation in Europe



Source: Marlboro-Water Price Index is calculated based on price data retrieved from Numbeo for the period 2023-2024. Total tax per pack is calculated based on tax share and price data (PPP, per pack of the most sold cigarette brand) from WHO (2022).

Figure 8 / The relationship between cigarette affordability (M-E) and taxation in Europe

Source: Marlboro-Eggs Price Index is calculated based on price data retrieved from Numbeo for the period 2023-2024. Total tax per pack is calculated based on tax share and price data (PPP, per pack of the most sold cigarette brand) from WHO (2022).

6. CONCLUSION

Overall, we argue that our two Marlboro indices, expressed in terms of other widely used consumables, paint a meaningful picture of cigarette affordability. The cross-country variation in affordability is well established in the comparative tobacco policy literature on Europe and is mainly attributed to a preference for ad valorem taxes (which allows for substitution to cheaper products and weakens the disincentivising effects on smoking behaviour), as well as low overall taxes in many (especially East European) countries (Peruga et al., 2021). Thus, our two Marlboro indices provide a more visually compelling illustration of one of the best-documented truths in public health research: tobacco taxes play an important role in the affordability and consumption of cigarettes, with inadequate tobacco tax levels and structures also posing a major adverse impact on individual and public health. Raising excise taxes to reduce cigarette affordability saves lives – and leaves non-smokers with more time and money to enjoy their omelettes.

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APPENDIX

Table A1 / Minutes of labour, packs of eggs and bottles of water 'necessary' to purchase a pack of Marlboro cigarettes

	Marlboro-Water	Marlboro-Eggs	Marlboro-MoL
Switzerland	8.81	1.41	16.52
Austria	8.28	1.49	19.98
Netherlands	11.47	1.92	23.58
Sweden	4.84	1.71	26.84
Denmark	6.28	1.89	27.68
Germany	9.70	2.43	28.99
Belgium	9.26	2.37	31.01
Spain	7.69	2.01	33.64
Italy	13.74	1.73	35.21
Finland	5.91	3.36	39.95
Slovenia	6.02	1.42	40.46
Greece	5.89	1.11	41.11
Estonia	5.49	2.08	44.15
Poland	7.39	1.50	45.03
Portugal	7.60	1.91	49.34
Latvia	5.76	1.75	50.59
Czechia	9.12	2.28	50.68
France	15.58	2.85	51.30
Bulgaria	4.93	0.99	51.60
Ireland	9.75	4.20	53.05
Lithuania	6.23	1.88	53.15
Slovakia	6.64	1.52	53.24
Croatia	4.76	1.45	57.84
Hungary	11.75	2.09	63.44
North Macedonia	5.58	1.32	64.53
Serbia	6.12	1.43	67.91
Romania	7.11	1.71	72.70
Georgia	4.79	1.26	
Ukraine	4.59	1.32	
Bosnia and Herzegovina	5.08	1.26	
Turkey	5.77	1.14	
Albania	5.58	1.07	
Norway	7.19	3.66	
United Kingdom	11.94	4.35	

IMPRESSUM

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Offenlegung nach § 25 Mediengesetz: Medieninhaber (Verleger): Verein "Wiener Institut für Internationale Wirtschaftsvergleiche", A 1060 Wien, Rahlgasse 3. Vereinszweck: Analyse der wirtschaftlichen Entwicklung der zentral- und osteuropäischen Länder sowie anderer Transformationswirtschaften sowohl mittels empirischer als auch theoretischer Studien und ihre Veröffentlichung; Erbringung von Beratungsleistungen für Regierungs- und Verwaltungsstellen, Firmen und Institutionen.

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