An analysis of Tobacco Industry pricing strategies in 23 European Union countries using commercial pricing data

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ABSTRACT:

Background:

The Tobacco Industry (TI) can act to undermine the impact of tobacco tax increases by adopting various pricing strategies. Little is known about strategies used across the European Union (EU), except for the UK.

Aims:

To examine pricing strategies adopted by the TI in the EU, and whether they differ by cigarette price segment, or between manufactured and roll-your-own (RYO) cigarettes.

Methods:

A longitudinal analysis of commercial pricing data for manufactured and RYO cigarettes from 23 EU countries, 2006-2017. Price and revenue trends were explored. Linear regression estimated the average annual change in revenue and linear fixed-effects panel regression models were used to explore the association between changes in median revenue (net of tax and adjusted for inflation) and tax increases in different price segments of manufactured cigarettes.

Results:

Over the 11-year period price gaps were observed in all countries. Average annual adjusted median net revenue per pack increased in 19 of 23 countries for manufactured and RYO cigarettes. A tax increase was associated with a significant decrease of -€0.09 in adjusted median net revenue per pack (95% Confidence Interval [CI] -0.16 to -0.03) in the cheap cigarette price segment, while no change was detected in the expensive cigarette price segment (-€0.05, 95% CI -0.11 to 0.01).

Conclusion:

Across the EU, pricing strategies adopted by the TI maintained or increased price gaps and retained cheaper tobacco products in the market, diminishing the impacts of tobacco tax increases. Further strengthening of tobacco taxation policy is needed to maximise the public health impacts.

INTRODUCTION

Increasing the price of tobacco products by means of tax rises is among the most effective population-level tobacco control measures,[1–3] and a cornerstone of the World Health Organization (WHO) Framework Convention on Tobacco Control.[4] The Tobacco Industry (TI) has long sought ways to influence tax policies and to undermine the effects of tax increases.[5–8] The European Union (EU), in Directive 2011/64/EU, has legislated on tobacco taxation, but only to stipulate the minimum level of excise duty that countries must impose.[8] This Directive is currently being reviewed so it is important to understand how the TI has responded to its existing provisions.

The TI can employ a range of measures to minimise the effects of tax rises on tobacco consumption. It can absorb the tax, thereby lowering its revenue (undershifting), pass it on in full through price increases commensurate to the tax increase, or overshift the tax, that is, raise prices above and beyond the tax increase thereby increasing revenue. It can take advantage of differing price elasticities of cheap and expensive products[9]; it can segment the market, thereby maintaining sales of cheap tobacco to price-sensitive consumers while increasing profits on more expensive products.[5,6] There is evidence that the TI does employ these and other pricing strategies in several countries, with the most comprehensive studies conducted in the UK.[5,6,10–13] Such strategies undermine the public health objectives of tobacco tax increases as more smokers, particularly the poorest,[14,15] are now consuming cheaper forms of manufactured or roll-your-own (RYO) cigarettes to maintain consumption.[14–17] This is problematic as access to cheap tobacco appears to reduce motivation for, and success in, quitting smoking.[18–21] Evidence from Ireland demonstrates that while the industry may warn governments against raising taxes, citing multiple potential adverse outcomes secondary to price increases, companies consistently increase the prices they charge for some products to maximise profit.[22]

However, there is no comprehensive picture of the strategies employed by the TI across the EU, which could inform the review of the Directive. The prospect of new legislation provides an obvious window of opportunity to advance tobacco control.[23,24] We have therefore undertaken a longitudinal analysis of EU country-specific pricing data on commercial cigarette and RYO tobacco products to ascertain changes over time in the context of tax increases, seeking evidence of tax undershifting or overshifting, and whether this varies across price segments and products.

METHODS

We conducted a longitudinal analysis of TI pricing strategies using routinely collected commercial pricing and taxation data on both cigarette and RYO tobacco products sampled from 23 EU countries from 2006 to 2017. Ethical approval was therefore not required.

Data sources

Euromonitor Passport

Euromonitor International is a market research company that publishes annual, country-specific reports on tobacco markets.[25] These include product pack size, brand and company, and prices in local currency. Sampling is designed to capture products that dominate the local market. Pricing data were available for cigarettes and RYO tobacco from 23 EU countries for years 2006-2017 (excluding Austria, Croatia, Cyprus, Luxembourg and Malta). Data were missing for 2007 from Belgium and 2006 from Slovakia. The initial dataset contained over 40,000 tobacco product pricing observations.

European Commission

Tobacco excise duties for manufactured cigarettes and RYO tobacco were obtained for all 23 EU countries and years included in the analysis from the European Commission's Communication and Information Resource Centre for Administrators, Businesses and Citizens (CIRCABC).[26]

Data

Price standardisation and adjustment

For comparison, prices were standardised to a 20-stick pack price for all cigarette and RYO tobacco products (referred to as manufactured and RYO cigarettes from here on).[5,6,27] For RYO

cigarettes, one stick was assumed to contain 0.75g of tobacco, based on recent European data.[5,28,29] Local currencies were converted into Euros using the historical exchange rates on the 1st of the month during which the data had been collected by Euromonitor, using data obtained from XE Corporation.[30] Pack prices were adjusted for inflation using the Harmonised Index of Consumer Prices (HICP), compiled by Eurostat,[31,32] and displayed in real terms using 2015 as the reference year.

Annual samples of <5 product price observations were removed. Thus, a total of 100 manufactured (0.3%) and 138 RYO (2.0%) cigarette pricing observations were excluded from the analysis including all Romanian RYO data.

Price segmentation

Four approaches to divide products into cheap and expensive were identified in the literature: (1) extensive review of commercial literature,[5,6,33] (2) division using quantiles,[34,35] (3) using prices of market-dominant brands,[11–13] or (4) a data-driven approach based on visual inspection of the price distribution.[36] Given the number of countries and years (274 country-year samples), the feasibility of the quantile and data driven methods were assessed.

We observed that pricing distributions, both within and between countries over time, assume many different shapes, precluding the visual data-driven approach. A quantile-based approach was therefore adopted to segment the data. Standardised 20-stick pack prices per year and country (in Euros) were arranged in ascending order and divided into quartiles. Products within the lower and upper quartiles (lower and upper 25th percentiles) were designated as cheap and expensive products, respectively. Segmentation of RYO cigarette pricing data was not undertaken as annual sample sizes were small.

Trends in manufactured and RYO cigarette pack prices

The median 20-stick pack price of cheap, expensive and RYO cigarettes, adjusted for inflation, was calculated by year and country and analysed graphically. The median was used as the measure of price given the skewed nature of pricing data.[37] Countries were divided into EU members prior to 2004 and those that joined afterwards.[38]

Tax pass through

Tobacco tax pass through, the extent to which companies shifted tobacco tax increases onto consumers through price increases or absorbed them by reducing profits, was assessed by calculating changes in median net revenue per pack of cheap, expensive and RYO cigarettes.[5,6] The median net revenue was calculated by subtracting the total tax paid per pack (specific, *ad valorem* and VAT), based on reported duties,[26] from the median pack price (Supplementary methods). Median net revenue was adjusted for inflation and presented graphically by year and product for each country. Year-to-year changes in adjusted median net revenue were then calculated by segment and product for all countries for the period 2006-2017.[5,6] If taxes are passed on fully to the consumer, the median net revenue should remain unchanged. A decrease in net revenue (negative change) suggests that the tax was (partially) absorbed by the company while an increase (positive change) implies overshifting of taxes, that is, the industry increased the price in excess of the tax increase.[6]

Statistical analysis

For each country, we used separate linear regression models to estimate average annual change in adjusted median net revenue for expensive, cheap or RYO cigarettes by regressing adjusted median net revenue on time.

A fixed-effects panel regression model was used separately for cheap and expensive cigarettes to explore the association between changes in adjusted median net revenue per 20-stick pack of manufactured cigarettes and tax increases. Panel regression models are an established method to analyse routinely collected data from multiple units over time, controlling for the clustering of observations within each country.[27,39] The fixed-effects specification allowed us to control for unobserved time-invariant factors that may be associated with the independent variables at the level of the country, and was supported by the results of the Hausman specification test. The model estimated the association between the independent (tax increase) and outcome (net revenue per pack) variable within each country but not between-country associations. Tax increase was included as a binary variable classified as present if there was an increase of ≥0.5% in the reported total tax burden compared with the previous year. Tax burden is expressed as a percentage of the tax included retail selling price (TIRSP, 2006-2010) or weighted average price (WAP, 2011-2017).[26] This threshold was adopted to exclude small increases in the recorded total tax burden potentially induced by non-tax changes, e.g. fluctuations in exchange rates. A sensitivity analysis with alternative thresholds of 1%, 2% and 3%, was also undertaken. Changes in net revenue one year post a tax increase were estimated by including a 1-year time lag variable. This analysis was not undertaken for RYO cigarettes as: (1) small sample sizes precluded segmentation and (2) total tax burden as a percent of the TIRSP/WAP is not reported for RYO tobacco. Data were analysed using Microsoft Excel and Stata/IC15.1.[40] The full regression models are available in the supplementary material.

RESULTS

Price segmentation

Pricing data were available for 34,107 manufactured cigarette and 6,963 RYO tobacco products from 23 EU countries in the period 2006-2017 (Supplementary Tables 1&2). All pricing distributions were separated into unique quartiles, except for data collected in 2008 for Denmark and 2016 for Romania as there was no price differentiation above the lowest quartile.

Analysis of pricing

Trends in adjusted median price of expensive and cheap cigarettes and RYO cigarettes are shown in Figures 1A&B. The adjusted median price of a 20-pack of expensive cigarettes ranged from €1.64 (Romania) to €13.46 (UK) in 2006 and from €3.07 (Bulgaria) to €12.89 (Ireland) in 2017. The adjusted median price of a 20-pack equivalent of RYO cigarettes ranged from €0.79 (Hungary) to €5.03 (UK) in 2006 and from €1.57 (Hungary) to €7.99 (Ireland) in 2017. The largest median difference, €4.56 (range €2.91 to €8.42), was observed in the UK, between expensive and RYO segments, and the lowest was observed in Bulgaria, between cheap manufactured and RYO cigarettes, €0.01 (range -€0.29 to €0.43).

Tobacco products were consistently cheaper in the post-2004 than pre-2004 countries, typically costing below €4.00 per pack. Prices increased gradually in most countries over the study period. This was also true when trends were measured using local currency (Supplementary Material)..

Tax pass through

Tax policy

During the period of analysis, all countries changed tobacco taxation for both manufactured cigarette and RYO tobacco (Supplementary Figures 3-5). In most, there were both increases in, and adjustments to, tax components, although their scale and nature varied.

Analysis of changes in net revenue

In all countries, and in all years, the adjusted median net revenue for a 20-pack of expensive manufactured cigarettes remained above that for cheap and RYO cigarettes in all pre-2004 countries (Figure 2A&B). The adjusted median net revenue was higher for cheap manufactured cigarettes compared to RYO cigarettes in 9 of the 13 pre-2004 countries throughout the study period. In 5 of the 9 post-2004 countries for which RYO data were included, the adjusted median net revenue was greater than that for cheap manufactured cigarettes in most years. In Bulgaria, Latvia and Lithuania the adjusted median net revenue obtained from a 20-stick pack of RYO cigarettes was greater than that for expensive manufactured cigarettes in most years, the difference ranging from -€0.09 to €0.44, -€0.18 to €0.40 and -€0.04 to €0.37 respectively.
As noted above, tax-shifting was assessed by calculating the year-on-year changes in adjusted median net revenue (Supplementary Tables 3&4). Evidence of overshifting (positive change) and/or undershifting (negative change) could be seen in all countries.

The average annual change in median net revenue for manufactured and RYO cigarettes was positive in the majority of countries over the period 2006-2017 (Table 1). There were positive changes for expensive and RYO cigarettes in 9 of 10 pre-2004 countries and in 3 of 5 for cheap cigarettes, while changes were all positive in post-2004 countries. In the post-2004 countries, significant annual increases in median net revenue were more common with cheap

manufactured cigarettes than with expensive manufactured and RYO cigarettes. In contrast, in pre-2004 countries, statistically significant increases were more common with expensive manufactured cigarettes.

We then used linear fixed-effects panel regression analysis to ascertain the consequences of a tax increase (≥0.5%) on adjusted median net revenue of cigarettes. There was a significant reduction of -€0.09 in revenue per pack from cheap manufactured cigarettes (95% Confidence Interval [CI] -0.16 to -0.03) in years when tax increases were observed (Table 2). There was no statistically significant change with expensive cigarettes (-€0.05, 95% CI -0.11 to 0.01). A sensitivity analysis using different thresholds, 1%, 2% or 3%, produced consistent findings (Supplementary Table 5). While a reduction in adjusted median net revenue was observed in the year following a tax increase, this decrease was not statistically significant using a threshold of 0.5%. However, a significant reduction in adjusted median net revenue for the cheap segment 1-year post tax increase was observed when using thresholds of 1%, 2% and 3%. No significant association between adjusted median net revenue and tax increase was observed for the expensive segment.

Table 1: Linear regression analysis of the estimated annual change in adjusted median net revenue for manufactured and RYO cigarettes over the period 2006 to 2017 in all countries grouped by year of EU accession.

Country	Estimated average annual change in adjusted median net revenue, €		
Pre-2004	**Expensive: ß (95 % CI)**	**Cheap: ß (95 % CI)**	**RYO: ß (95 % CI)**
Belgium†	0.035* (0.018 to 0.053)	0.015 (-0.002 to 0.033)	0.015* (0.002 to 0.029)
Denmark	0.023 (-0.057 to 0.103)	-0.033 (-0.111 to 0.044)	0.023* (0.003 to 0.044)
Finland†	-0.014* (-0.027 to -0.001)	-0.001 (-0.01 to 0.008)	-0.016* (-0.026 to -0.005)
France†	0.038* (0.015 to 0.06)	0.042* (0.021 to 0.063)	0.064* (0.038 to 0.09)
Germany	0.049* (0.029 to 0.07)	0.064* (0.048 to 0.079)	0.034* (0.008 to 0.059)
Greece	0.026 (-0.016 to 0.067)	-0.001 (-0.022 to 0.02)	-0.002 (-0.019 to 0.014)
Ireland	0.145* (0.101 to 0.189)	0.038 (0 to 0.077)	0.08* (0.039 to 0.121)
Italy	0.017* (0.014 to 0.02)	0.005 (-0.003 to 0.013)	0.024* (0.019 to 0.029)
Netherlands	0.081* (0.044 to 0.119)	0.044 (-0.008 to 0.096)	0.030* (0.001 to 0.058)
Portugal	0.072* (0.053 to 0.091)	0.051* (0.03 to 0.072)	0.039 (-0.015 to 0.092)
Spain†	0.044* (0.031 to 0.057)	0.043* (0.03 to 0.056)	0.042* (0.014 to 0.07)
Sweden	0.053* (0.013 to 0.092)	-0.056* (-0.097 to -0.015)	0.094 (-0.011 to 0.2)
United Kingdom	0.098 (-0.104 to 0.3)	0.084 (-0.028 to 0.196)	0.121* (0.056 to 0.187)
Post-2004			
Bulgaria†	0.024 (-0.016 to 0.063)	0.014 (-0.022 to 0.05)	0.023* (0.003 to 0.044)
Czech Republic	0.005 (-0.018 to 0.028)	0.04* (0.029 to 0.051)	-0.028 (-0.057 to 0.001)
Estonia	0.022 (-0.02 to 0.064)	0.022 (-0.005 to 0.048)	0.012 (-0.024 to 0.049)
Hungary	0.005 (-0.022 to 0.032)	0.043* (0.016 to 0.071)	0.016* (0.005 to 0.026)
Latvia†	0.023* (0.003 to 0.042)	0.043* (0.027 to 0.060)	0.035 (-0.005 to 0.075)
Lithuania†	0.002 (-0.031 to 0.035)	0.036* (0.015 to 0.058)	0.048* (0.027 to 0.069)
Poland	0.037* (0.016 to 0.057)	0.039* (0.023 to 0.056)	0.016 (-0.009 to 0.04)
Romania§	0.102* (0.045 to 0.159)	0.083* (0.046 to 0.12)	-
Slovakia†	0.007 (-0.017 to 0.031)	0.035* (0.007 to 0.062)	0.107* (0.068 to 0.146)
Slovenia	0.029* (0.023 to 0.035)	0.012* (0.004 to 0.019)	-0.008 (-0.022 to 0.006)

† Less than 12 annual data points available for the analysis
* Statistically significant
§ RYO data not used due to small (<5) annual sample sizes

Table 2: Association between tax increase and change in adjusted median net revenue (€) estimated using linear fixed-effects panel regression models.

Price segment	Tax increase	β	P value	95 % CI
Cheap	Within year	-0.09	0.003	-0.16 to -0.03
	1-year lag	-0.05	0.106	-0.11 to 0.01
Expensive	Within year	-0.05	0.106	-0.11 to 0.01
	1-year lag	-0.01	0.823	-0.09 to 0.07

Note: Regression analyses were performed separately for each cigarette price segment. Pricing data were not available for every year in all countries (see methods for details).

DISCUSSION

Our findings suggest that across 23 EU countries, between 2006 and 2017, tax increases were selectively undershifted in the cheap segment of the cigarette market and there was exploitation of the low tax rate imposed on RYO tobacco. This likely maintained availability of cheap forms of tobacco while realising increases in revenue.

Throughout the study period, a range of prices was observed, with comparatively cheaper tobacco products being present in all markets in the form of cheaper manufactured and/or RYO cigarettes. Although tax increases were imposed on RYO tobacco, the price of RYO cigarettes was consistently below that of expensive cigarettes in all 23 countries, with a price gap between expensive and cheap cigarettes also seen in most years. This suggests that smokers had the opportunity to downtrade to a cheaper form of tobacco in the face of tax increases, as observed in previous UK studies,[5,6] thereby negating the potential impact on consumption. This is in agreement with studies in the EU, and elsewhere, demonstrating ongoing availability, and increasing use of, relatively cheap forms of tobacco, factors known to undermine cessation efforts.[16,20,21,41] In this way, cheap and RYO cigarettes serve as substitutes for more expensive products,[42–45] a phenomenon supported by the large price gap between manufactured and RYO cigarettes across many countries,[31] and the country-level analyses presented here.

In the majority of countries, the annual average change in adjusted net revenue for a pack of expensive, cheap and RYO cigarettes was estimated to be positive, demonstrating that while overall consumption of cigarettes, particularly premium brands, is declining, differential shifting of taxes and rising consumption of cheaper forms of tobacco, such as RYO, increase industry revenue and presumably profits.[5,6] Interestingly, among post-2004 countries the number of significant increases in revenue was greatest in the cheap cigarette segment, while

this was observed in the expensive cigarette price segment among pre-2004 countries. This may reflect how Trans-national Tobacco Companies (TTCs) lobby for policies that favour the sale of international premium brands in Eastern European countries, but promote cheaper products through static prices and price promotions in countries with high tobacco taxes and strict tobacco control, such as the UK.[5–7,46,47] In addition, the observed net revenue obtained from RYO cigarettes was, in some countries, greater than with manufactured cigarettes, both cheap and, in some cases, expensive. This may reflect exploitation by the industry of the differential taxation systems imposed on manufactured versus RYO cigarettes, as has been reported recently in the UK and Spain.[8,29,48]

The regression analysis provided an overview of the patterns of change. Following tax increases, revenue from cheap cigarettes fell but there was no change with expensive cigarettes. Put another way, the TI absorbed tax increases on cheaper cigarettes, to ensure that they remained affordable, but passed tax increases on to expensive cigarettes. Two previous studies revealed varying patterns of tax-shifting across Europe[38,49] but both looked at the overall cigarette market, rather than price segments within it, using the most popular price category (a measure subsequently shown to reflect premium product prices[6,48]) and one was performed before enlargement of the EU and market consolidation.[49] A Ukraine-based study suggested that, when analysing the cigarette market as a whole, lower tax increases were absorbed but larger ones were overshifted.[50] Our findings suggest that undershifting of taxes was observed in the cheap segment of the manufactured cigarette market, regardless of the magnitude of tax increase included in the model. By analysing differential use of tax-shifting among price segments, this study adds to evidence from previous studies and, in combination with UK-based analyses,[5,6] establishes the importance of studying the impacts of taxes by price segment and product.

To our knowledge, this is the first study using a fixed-effects panel regression model with data from multiple time points and countries to measure the association between tax and revenue changes across the EU, while controlling for the clustering of the within-country observations as well as regional and unobserved time-invariant factors, potentially associated with tax changes. As TI responses to tax increases could plausibly vary with the timing of a tax increase relative to previous increases, or in anticipation of future taxes, time may explain, in part, any association between tax and revenue changes. Consequently, we did not include time in our model. It is possible that our findings could differ if we had looked only at individual countries but this would have reduced statistical power. However, as four TTCs dominate the EU market,[51] it is reasonable to estimate strength of association across the region as a whole.

This study has several limitations. The nature of our data precluded analysis using industry-defined price segments, i.e., use of ultra-low, discount, mid-range and premium, limiting comparability with other studies.[5,6] However, our data source has the advantage of size, permitting analysis of trends in price and revenue of manufactured and RYO cigarettes at country level over an 11-year period. Our use of quartiles can be justified as being data driven. Second, Euromonitor International data are intended predominantly for commercial use and do not include some parameters such as price promotions that may reduce price. However, given how price promotions tend to be concentrated in the cheap segment of the market,[5] their omission is likely to have underestimated the price differentials we found. Standardisation of pack sizes may similarly have led to an underestimate of the real-world price gap between cheap and expensive pack prices.[5] On the other hand, as the data reflect retail prices they are not influenced by recall or rounding biases introduced by self-reporting of prices.[52,53] Importantly, prior studies support the use of commercial data in public health research.[27,54,55]

Additionally, the data are collected annually, so we could not analyse changes on a month-by-month scale. Studies in the UK and South Africa revealed undershifting immediately after tax increases with subsequent recovery and an increase in revenue through overshifting later in the year.[5,10] We could also not segment the RYO price distributions, limiting the analysis of differential tax-shifting to manufactured cigarettes. We also assumed an average weight of 0.75g for RYO cigarettes, although variation has been documented in reported weights between EU countries.[28] Finally, we could not assess changes in market share or shifts in individual choice of brands, and nor could we take account of illicit tobacco products, although this comprises a small share of the EU market, contrary to what might be assumed given the strenuous efforts by the TI to exaggerate it as part of their argument against tax rises.[8,16,56] Similarly, we could not assess affordability, so price increases might not reduce affordability.[38] These limitations are, however, unlikely to explain fully the key findings of our analysis.

Research and Policy implications

Further research is needed, in particular of pricing strategies adopted at national or regional level, incorporating data on price promotions and measures of consumption and affordability. Other research could explore pricing strategies adopted in response to changes in the various elements of tobacco tax to assess whether these vary by price segment and tobacco product.

Complementing previous UK-based analyses, the evidence presented here points to TI pricing strategies that potentially undermined the public health objectives of tobacco taxes. As EU Directive 2011/64/EU is currently under review,[31] there is a window of opportunity to address this issue.[31] As called for by other researchers, there is a need for more sophisticated measures to support price increases and to reduce price gaps, and to understand and address TI strategies

designed to undermine tax increases. Such measures may include adoption of a larger specific excise tax element,[57] delivering larger and unannounced tax increases, and increasing taxation of RYO tobacco.[5,8,31] Furthermore, non-tax pricing strategies, such as the adoption of minimum markup/price laws, an effective method of increasing prices of the cheapest cigarettes, should be considered and may serve to complement tax-based policies.[58–60]

The study has implications for tax design and implementation in other regions that are seeking to strengthen tobacco control and for those considering taxes on other products harmful to health, such as products of the alcohol and sugar-sweetened beverage industries, which have adopted similar strategies to that of the TI to maintain consumption and influence policy.[61–63]

CONCLUSIONS

This study extends previous research in the UK, providing evidence to suggest that the TI adopts pricing strategies that reduce the impact of tobacco tax increases in EU countries by maintaining the availability of cheaper forms of tobacco. Such activities serve to jeopardise public health gains and exacerbate smoking-related inequalities. We provide further evidence of the need for strengthening, and ongoing evaluation of, tobacco taxation policy and delivery, to achieve the public health objective of tobacco taxation.

WHAT THIS PAPER ADDS:

What is already known on this subject:

- ◊ Comprehensive UK-based studies show that the Tobacco Industry (TI) adopts pricing strategies that undermine the public health impacts of tobacco taxes.
- ◊ Across the EU, there are large differences in prices of manufactured cigarettes and RYO tobacco products.

What important gaps in knowledge exist on this topic:

- ◊ Little is known about contemporary use of pricing strategies by the TI across the EU, even though this information is important to inform current revisions to tobacco tax legislation.
- ◊ Analyses of price differentials in tobacco markets across the EU are lacking.

What this paper adds:

- ◊ The pricing strategies adopted by the TI potentially undermine the impact of tobacco taxes across the EU by retaining cheaper forms of tobacco in the market.
- ◊ The TI appears to absorb tax increases differentially between cigarette prices segments thereby maintaining cheaper manufactured cigarettes in the EU market.
- ◊ The current revision to the EU tobacco tax Directive offers scope for advancing public health objectives.

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Ethics: not required

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Figure 1: Adjusted median 20-stick pack price for manufactured and RYO cigarettes from 2006 to 2017 in countries who (**A**) joined the EU prior to 2004 (**B**) countries who joined the EU after 2004.

* Note the use of different scales for Ireland and the United Kingdom.

Note: Prices were adjusted for inflation using the HICP and pack sizes were standardised to 20 sticks. Non-Euro prices have been converted to Euros using historical exchange rates. Pricing data was not available for every year in all countries (see methods for details).

Figure 2: Adjusted median net revenue for manufactured and RYO cigarettes from 2006 to 2017 in countries who (**A**) joined the EU prior to 2004 and (**B**) joined the EU post 2004.

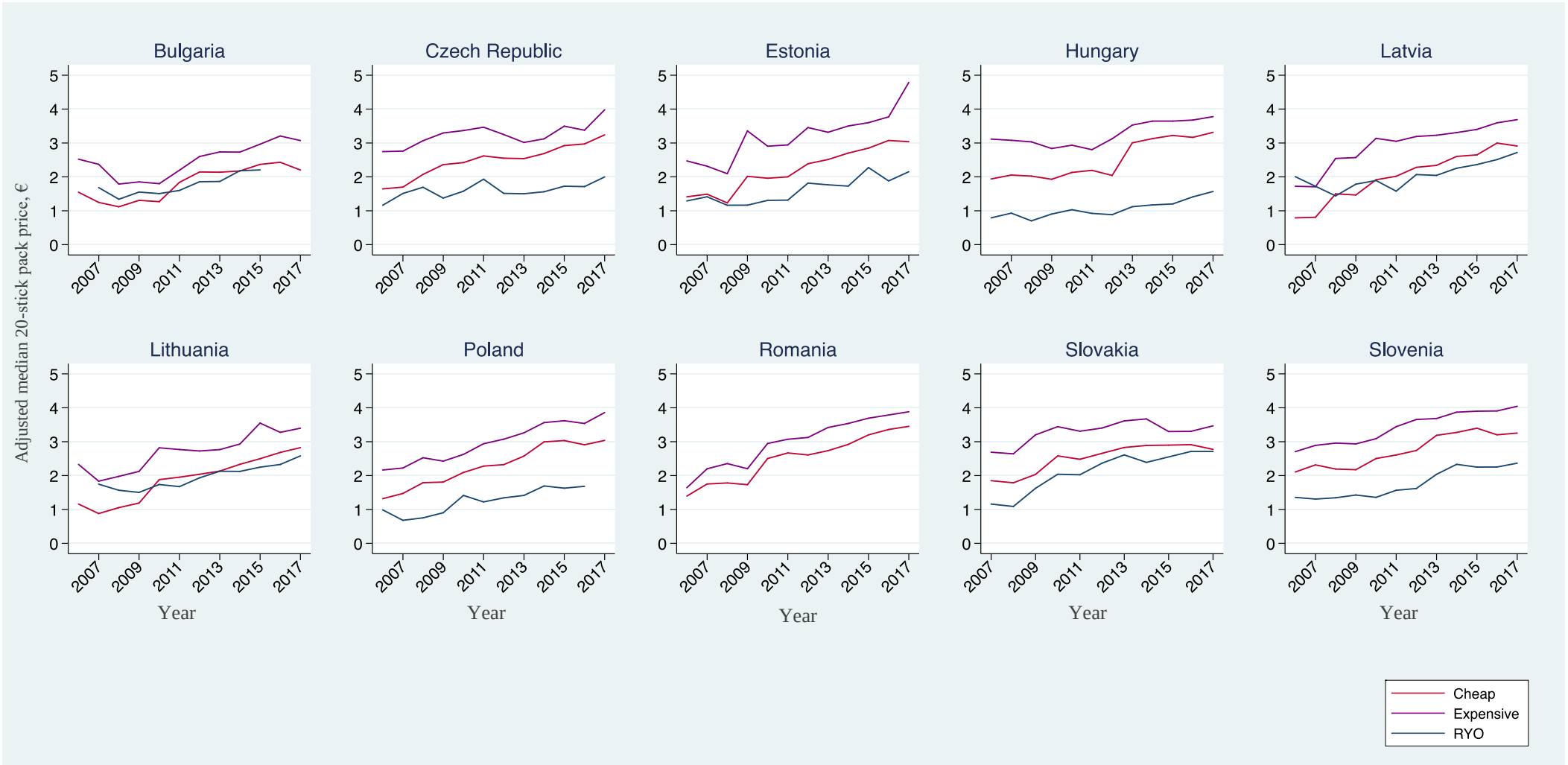
* Note, different scales used for Ireland and the United Kingdom.

Note: Revenue was adjusted for inflation using the HICP. All results are shown in Euros. Pricing data was not available for every year in all countries (see methods for details).

A


Belgium
Denmark
Finland
France
Germany
Greece
Ireland*
Italy
Netherlands
Portugal
Spain
Sweden
United Kingdom*
Adjusted median 20-stick pack price, €
Year
Cheap
Expensive
RYO

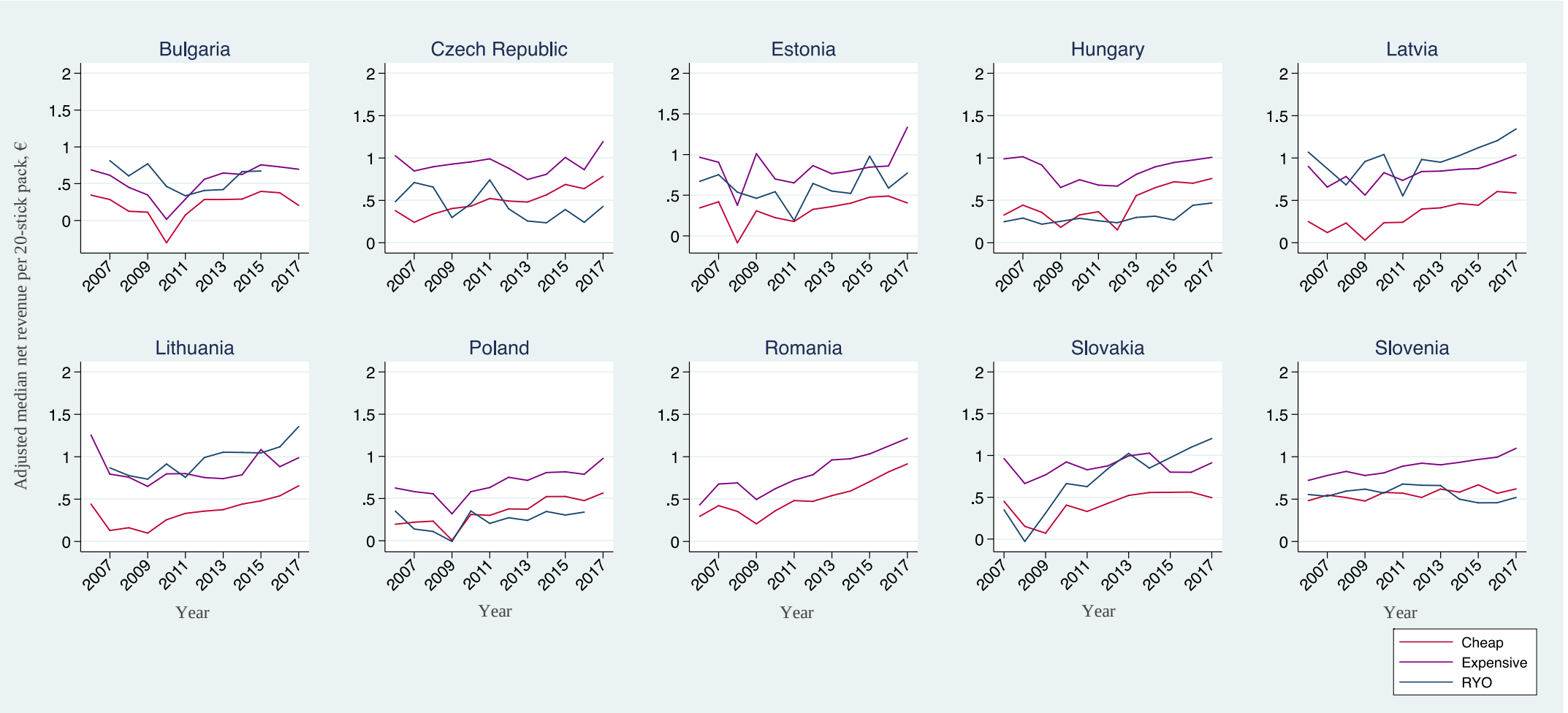
B


Bulgaria
Czech Republic
Estonia
Hungary
Latvia
Lithuania
Poland
Romania
Slovakia
Slovenia
Adjusted median 20-stick pack price, €
Year
Cheap
Expensive
RYO

A


Belgium
Denmark
Finland
France
Germany
Greece
Ireland*
Italy
Netherlands
Portugal
Spain
Sweden
United Kingdom*
Adjusted median net revenue per 20-stick pack, €
Year
Cheap
Expensive
RYO

B


Bulgaria
Czech Republic
Estonia
Hungary
Latvia
Lithuania
Poland
Romania
Slovakia
Slovenia
Adjusted median net revenue per 20-stick pack, €
0
.5
1
1.5
2
2007
2009
2011
2013
2015
2017
Year
Cheap
Expensive
RYO