

Appendix

Appendix Table A1. Scoring criteria of the Tobacconomics Cigarette Scorecard

Key component	Scoring criteria
Cigarette price	<p>The price of a 20-cigarette pack of the most-sold brand in international dollars (in 2018 purchasing power parity) is used for the scores of the Cigarette price component.</p> <ul style="list-style-type: none"> - 5: Price \geq 10.0 Intl\$ PPP - 4: $8.0 \leq$ Price $<$ 10.0 - 3: $6.0 \leq$ Price $<$ 8.0 - 2: $4.0 \leq$ Price $<$ 6.0 - 1: $2.0 \leq$ Price $<$ 4.0 - 0: Price $<$ 2.0 Intl\$ PPP
Change in cigarette affordability	<p>Change in affordability is based on the six-year trend of cigarette affordability, which is measured as a percentage of per capita GDP to purchase a 20-stick pack cigarette of the most-sold brand. Higher scores are given to countries experiencing a decreased affordability resulting from an excise tax increase.</p> <ul style="list-style-type: none"> - 5: 7.5% average annual change or higher - 4: $5.0\% \leq$ average annual change $<$ 7.5% - 3: $2.5\% \leq$ average annual change $<$ 5.0% - 2: Average annual change $<$ 2.5% - 1: Reduced affordability, but no excise tax increase - 0: Increased affordability or no statistically significant change
Tax share	<p>The tax share component is assessed using both the share of excise taxes and the share of total taxes in retail price. The average score of each of these share measures used as the score of the tax share component.</p> <p>Total Tax Share:</p> <ul style="list-style-type: none"> - 5: 75% total tax share or higher - 4: $65\% \leq$ share $<$ 75% - 3: $55\% \leq$ share $<$ 65% - 2: $45\% \leq$ share $<$ 55% - 1: $35\% \leq$ share $<$ 45% - 0: Total tax share $<$ 35% <p>Excise Tax share:</p> <ul style="list-style-type: none"> - 5: 70% excise tax share or higher

	<ul style="list-style-type: none"> - 4: $60\% \leq \text{share} < 70\%$ - 3: $50\% \leq \text{share} < 60\%$ - 2: $40\% \leq \text{share} < 50\%$ - 1: $30\% \leq \text{share} < 40\%$ - 0: Excise tax share $< 30\%$
Tax structure	<p>The tax structure component evaluates cigarette tax structures in multiple dimensions. Higher scores are given to countries with excise tax structures and to countries with simple, uniform tax structures.</p> <ul style="list-style-type: none"> - 5: uniform specific tax with an automatic inflation or other adjustment; or a uniform mixed system with greater share of specific tax, with an automatic adjustment for the specific component, the retail price as the base for the ad valorem component, and a minimum specific tax - 4: A uniform specific tax or uniform mixed system with a greater share of specific tax but without other features listed above - 3: A uniform mixed system with a greater share of ad valorem tax - 2: A uniform ad valorem tax - 1: A tiered specific or ad valorem excise tax - 0: No excise tax

Main Regression Model

The following specification is used to assess the association between the overall cigarette tax scores and tobacco excise tax revenue per capita:

$$PerCapitaRevenue_{it} = a_0 + \beta * OverallScore_{it} + X_{it} + \gamma_i + \theta_t + \varepsilon_{it}$$

where i and t refer to country and year, respectively

β is our parameter of interest which is the coefficient on the association between the overall cigarette tax scores ($OverallScore_{it}$) and tobacco excise tax revenue per capita ($PerCapitaRevenue_{it}$). X_{it} represents time-variant country-level factors including GDP per capita, total tax revenue (%) of GDP, tobacco control environment (POWE), % population aged 15–64, and % population aged 65+. Country fixed effects (γ_i) control for time-invariant and unobservable factors at the country level. Year fixed effects (θ_t) are included to address unobserved time-related socioeconomic changes which are constant across all countries.

Appendix Table A2. Alternative specifications

	(1)	(2)	(3)
VARIABLES	Logged tobacco excise tax revenue per capita	Tobacco excise tax revenue (%) of GDP	Tobacco excise tax revenue (%) of total tax revenue
Overall cigarette tax score	0.17** (0.07)	0.08*** (0.02)	0.09*** (0.03)
GDP per capita	-0.45 (0.30)	-0.26*** (0.05)	-0.32*** (0.07)
Total tax revenue (%) of GDP	-0.05 (0.07)	0.01 (0.01)	-0.06*** (0.02)
POWE	0.13* (0.07)	0.02** (0.01)	0.03** (0.01)
Population (%) of age 15-64	0.22 (0.25)	0.01 (0.03)	0.01 (0.03)
Population (%) of age 65+	0.32 (0.34)	-0.03 (0.05)	-0.03 (0.05)
Year 2016	0.05 (0.07)	0.09 (0.03)	0.10 (0.04)
Year 2018	0.02 (0.14)	0.10 (0.06)	0.12 (0.07)
Observations	176	176	175
Mean of outcome variable	4.725	0.007	0.038

Column (1) is based on an Ordinary Least Squares (OLS) estimation. Column (2) and (3) are based on a binomial Generalized Linear Model (GLM) with a logistic link. Regressions include country and year fixed effects. Standard errors clustered at country-level are presented in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Appendix Table A3. The association between each cigarette tax component score and tobacco excise tax revenue per capita

VARIABLES	(1) All component scores	(2) Price score only	(3) Affordability change score only	(4) Tax share score only	(5) Tax structure score only
Price score	6.66 (8.67)	11.39 (6.89)			
Affordability change score	2.45 (2.20)		3.18* (1.67)		
Tax share score	12.06** (4.84)			11.99** (5.44)	
Tax structure score	-2.13 (3.76)				-1.89 (3.90)
GDP per capita	-49.36*** (8.85)	-52.83*** (7.17)	-56.41*** (6.90)	-54.68*** (7.34)	-59.44*** (6.35)
Total tax revenue (%) of GDP	3.14* (1.84)	2.12 (1.75)	2.04 (1.82)	2.02 (1.71)	1.45 (1.72)
POWE	6.32** (2.97)	4.38 (2.67)	6.57** (2.88)	4.95* (2.71)	4.33 (2.78)
Population (%) of age 15-64	-9.02* (4.66)	-10.14** (4.81)	-8.00 (4.96)	-8.33 (5.07)	-8.24 (5.09)
Population (%) of age 65+	8.94 (10.38)	4.01 (9.46)	11.64 (9.14)	9.32 (8.68)	8.57 (9.16)
Year 2016	9.07* (5.04)	12.80** (5.22)	10.93** (5.00)	10.63** (4.99)	14.03*** (5.54)
Year 2018	1.86 (9.21)	8.98 (8.67)	6.82 (9.01)	5.75 (9.29)	12.47 (9.58)
Observations	176	176	176	176	176
R-squared	0.986	0.985	0.985	0.985	0.985
Mean (tobacco excise tax revenue per capita)	212.98	212.98	212.98	212.98	212.98

Regressions include country and year fixed effects. Standard errors clustered at country-level are presented in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Appendix Table A4. The increase of tobacco excise tax revenue (%) of GDP when there is a 1-point increase in overall cigarette score, by country with available data

Country	Income group	Increase in tobacco excise tax revenue (%) of GDP – using all country estimates	Increase in tobacco excise tax revenue (%) of GDP – using LMIC estimates
Argentina	HIC	0.04%	-
Australia	HIC	0.02%	-
Austria	HIC	0.02%	-
Belarus	LMIC	0.05%	0.05%
Belgium	HIC	0.02%	-
Bosnia and Herzegovina	LMIC	0.07%	0.06%
Brazil	LMIC	0.06%	0.06%
Bulgaria	LMIC	0.04%	0.04%
Cambodia	LMIC	0.19%	0.18%
Cameroon	LMIC	0.18%	0.17%
Canada	HIC	0.02%	-
Chile	HIC	0.04%	-
China	LMIC	0.06%	0.06%
Colombia	LMIC	0.06%	0.06%
Croatia	HIC	0.04%	-
Czechia	HIC	0.02%	-
Denmark	HIC	0.02%	-
Estonia	HIC	0.03%	-
Ethiopia	LMIC	0.33%	0.31%
Finland	HIC	0.02%	-
France	HIC	0.02%	-
Georgia	LMIC	0.07%	0.06%
Germany	HIC	0.02%	-
Ghana	LMIC	0.14%	0.13%
Greece	HIC	0.03%	-
Guatemala	LMIC	0.09%	0.09%
Hungary	HIC	0.03%	-
Indonesia	LMIC	0.08%	0.07%
Ireland	HIC	0.01%	-
Italy	HIC	0.02%	-
Jordan	LMIC	0.08%	0.07%

Kazakhstan	LMIC	0.03%	0.03%
Latvia	HIC	0.03%	-
Mexico	LMIC	0.04%	0.04%
Morocco	LMIC	0.11%	0.11%
Myanmar	LMIC	0.19%	0.18%
Netherlands	HIC	0.02%	-
New Zealand	HIC	0.02%	-
North Macedonia	LMIC	0.06%	0.06%
Norway	HIC	0.01%	-
Panama	HIC	0.03%	-
Paraguay	LMIC	0.06%	0.06%
Peru	LMIC	0.07%	0.06%
Philippines	LMIC	0.09%	0.09%
Poland	HIC	0.03%	-
Portugal	HIC	0.03%	-
Republic of Korea	HIC	0.02%	-
Romania	LMIC	0.03%	0.03%
Russian Federation	LMIC	0.03%	0.03%
Saudi Arabia	HIC	0.02%	-
Serbia	LMIC	0.06%	0.05%
Singapore	HIC	0.01%	-
Slovakia	HIC	0.03%	-
Slovenia	HIC	0.03%	-
South Africa	LMIC	0.06%	0.06%
Spain	HIC	0.03%	-
Sri Lanka	LMIC	0.07%	0.07%
Sweden	HIC	0.02%	-
Switzerland	HIC	0.01%	-
Uganda	LMIC	0.29%	0.28%
Ukraine	LMIC	0.08%	0.08%
United Kingdom of Great Britain and Northern Ireland	HIC	0.02%	-
Uruguay	HIC	0.04%	-
Uzbekistan	LMIC	0.12%	0.11%

Note: The estimates assume that population size and currency values in each country remains the same as 2018