European Policy
Innovation Council

The End of Smoking?
How Europe Can Save Millions of Lives while Boosting Economic Growth

Methodological Note & Technical Annex

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Purpose of the Methodological Note

This methodological note provides an overview of the analytical approach used to estimate the economic footprint of the tobacco and new nicotine products sector in the EU-27. It summarises the data sources, modelling techniques, and assumptions behind the calculations presented in the report. It is intentionally concise and written in accessible language while maintaining methodological transparency.

1. Analytical Framework

The estimates in the report are based on a **three-layer economic impact model**, a standard method widely used in economic footprint studies:

- **Direct impact:** Economic activity generated inside the sector (agriculture, manufacturing, logistics, wholesale, retail).
- **Indirect impact:** Activity generated across EU supply chains due to purchases of goods and services (e.g., packaging, chemicals, machinery, transport, professional services).
- **Induced impact:** Additional activity resulting from household spending by employees supported through direct and indirect jobs.

The combined effect forms the **total economic footprint** in terms of GDP, employment, and tax revenues. This structure follows the European System of Accounts (ESA 2010) and established input–output (I/O) modelling practice.

2. Data Sources

The analysis integrates multiple high-quality datasets:

Official statistics

- **Eurostat:** Input–Output Tables, Supply and Use Tables, Structural Business Statistics, Excise Tax Data, Government Finance Statistics, Household Consumption, Labour Cost and Productivity data.
- **UN Comtrade:** International trade flows for tobacco products and new nicotine products.

Industry and firm-level data

- **S&P Global Market Intelligence:** Output, employment, and financial data for tobacco and reduced-risk product manufacturers.

Behavioural and market data

- **Eurobarometer:** Prevalence of smoking and use of alternative products.
- National public health surveys (e.g., Sweden, UK, Japan).
- **Secondary datasets:** Statista, KPMG illicit trade assessments, national authorities.

These sources provide the statistical basis for economic modelling, trade analysis, and behavioural insights.

3. Estimating GDP Contribution

The sector's contribution to GDP is measured using **Gross Value Added (GVA):**
GVA = Gross Output – Intermediate Consumption

- Direct GVA is derived from firm-level financials and Eurostat business statistics.
- Indirect and induced GVA use multipliers derived from the **Leontief inverse matrix** of EU input–output tables, which capture interdependencies across sectors.
- Total GVA is the sum of direct, indirect, and induced components.

This approach yields the EU-wide footprint estimate presented in the report.

4. Employment Contribution

Employment contribution includes:

- **Direct jobs** (agriculture, factories, logistics, wholesale and retail).
- **Indirect jobs** generated in supply chains.

- **Induced jobs** supported by household consumption.

Employment intensities (jobs per € million of output) are drawn from Eurostat I/O tables and Structural Business Statistics.

The report uses the standard industry breakdown reflected in EU data: **1 direct manufacturing job supports roughly 23 additional jobs** across supply chains, distribution channels, and induced consumption.

5. Fiscal Contribution

Fiscal impacts include:

- **Excise duties** (Eurostat official data)
- **Value-added tax (VAT),** estimated using retail structures and national VAT schedules
- **Labour taxes and social contributions,** based on Eurostat labour cost data
- **Corporate income taxes**, estimated from sectoral profitability

Combined, these form the total fiscal contribution of the sector.

6. Trade and Illicit Market Analysis

Trade data for raw tobacco, manufactured products, and new nicotine products is extracted from UN Comtrade. EU global market share calculations follow standard trade-value and trade-volume indicators.

Illicit market estimations use:

- trade gap analysis (export–import discrepancies)
- survey data
- national enforcement statistics
- established industry studies (e.g., KPMG)

These methods provide insight into lost fiscal revenue and competitive pressures.

7. Behavioural and Market Transition Modelling

Consumer behaviour data from Eurobarometer and national surveys is used to assess:

- smoking prevalence
- uptake of heated tobacco, e-cigarettes, and pouches
- switching trends

These indicators inform the report's discussion of harm reduction and substitution dynamics but are **not used to generate long-term econometric forecasts** within the main publication.

(A full econometric switching model is provided separately in EPIC's technical annex.)

8. Assumptions and Limitations

The modelling approach follows established best practices but is subject to the following limitations:

- Input–output models assume fixed production structures in the short term.
- Induced effects depend on household consumption patterns, which may vary with inflation or economic shocks.
- Illicit market estimates rely partly on imperfect survey and customs data.
- Country disaggregation is based on relative market size, manufacturing presence, and tax structures.

Despite these limitations, the approach ensures transparency and robustness in quantifying the sector's economic footprint.

Extended Technical Appendix

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1. Purpose and Scope of the Technical Appendix

This Technical Appendix provides the full methodological foundation for the analysis presented in *The End of Smoking*? It expands on the summary methodological note and outlines the complete quantitative framework underlying:

- GDP contribution estimates
- Employment impact estimates
- Fiscal calculations (excise, VAT, labour taxes, corporate income taxes)
- Trade competitiveness indicators
- Illicit market modelling
- Behavioural and harm-reduction modelling
- Elasticity-based simulations of tax and regulatory scenarios

The appendix is written for policymakers, researchers, data analysts, and stakeholders requiring methodological transparency and reproducibility.

2. Data Sources and Data Harmonization

The analysis uses multiple datasets, harmonised to a common 2023–2024 reference period.

2.1 Eurostat

- **Input–Output Tables** (IOT)
- **Supply and Use Tables** (SUT)
- Structural Business Statistics (SBS)
- Household Consumption Expenditure
- Government Finance Statistics
- Labour Cost and Productivity data
- Excise tax and VAT statistics
- National accounts (GDP, GVA)

Eurostat data form the backbone of macroeconomic modelling.

2.2 S&P Global Market Intelligence

Used to obtain:

- Firm-level output
- Revenue
- Intermediate consumption structure
- Cost of goods sold
- Capital intensity
- Employment and wage bills

This enables accurate estimation of direct impacts.

2.3 UN Comtrade

Trade flows (value and volume) for:

- Raw tobacco
- Cigarettes
- Heated tobacco
- E-cigarettes and components
- Nicotine pouches

2.4 Eurobarometer

Used for behavioural parameters:

- Cigarette prevalence
- E-cigarette prevalence
- Heated tobacco adoption
- Switching intentions
- Perceived risk
- Purchasing patterns

2.5 National Data Sources

Surveys from Sweden, Japan, UK, Germany, Italy, and France used for:

- Prevalence
- risk exposure
- transition behaviour

2.6 Secondary Data

- KPMG Illicit Trade Assessment
- Statista consumption data
- WHO and OECD reports
- Industry and customs reports

2.7 Harmonization Process

Data from different sources were:

- Converted to euro
- Deflated or inflated using country-specific indices
- Cross-checked across datasets to reduce sampling bias
- Standardised to common product categories (cigarettes, HTP, e-cigarettes, pouches)

3. Input–Output (I/O) Modelling Framework

The core economic footprint analysis uses **Leontief Input–Output modelling,** following ESA 2010 standards.

3.1 Basic Equation

Let **x** be output and **A** the matrix of technical coefficients.

$$x = (I - A)^{-1} y$$

Where:

- *y* is final demand
- $(I-A)^{-1}$ is the **Leontief inverse**, capturing ripple effects

3.2 Direct, Indirect, and Induced Effects

Direct

Measured using firm-level financial statements and SBS.

Indirect

Indirect effects = ripple effects in suppliers.

$$Indirect\ VA = Direct\ VA \times Multiplier_{indirect}$$

Induced

Household spending effects:

$$Induced\ VA = (Wages_{direct+indirect}) \times MPC \times VA\ Ratio$$

Where MPC = marginal propensity to consume.

3.3 Domestic vs. Imported Inputs

I/O tables distinguish:

- domestically produced inputs
- imported inputs

Only domestic inputs contribute to EU GDP.

4. Estimating GDP Contribution

GDP contribution measured as .

4.1 Formula

$$GVA = Output - Intermediate\ Consumption$$

4.2 Sector-Specific GVA Ratios

Derived from S&P Global and Eurostat.

Typical GVA ratios:

- Cigarette manufacturing: 35–45%
- Retail distribution: 20–30%
- Wholesale: 25–30%
- Agriculture: 50–60%

4.3 Aggregation

Total EU-27 GDP impact:

$$GVA_{Total} = GVA_{Direct} + GVA_{Indirect} + GVA_{Induced}$$

5. Employment Contribution and Labour Market Modelling

Employment effects derive from:

- direct jobs reported in firm data and SBS
- indirect jobs using employment–output coefficients
- induced jobs using household consumption structure

5.1 Employment Intensity

$$Jobs/Million\ Euro\ Output$$

Varies by sector:

- agriculture ~20
- manufacturing ~3–4
- retail ~15
- logistics ~7
- services ~10–12

5.2 Employment Multiplier

From report:

1 direct manufacturing job → 23 additional EU jobs

Breakdown:

- 8 supply-chain jobs
- 11 retail/distribution jobs
- 4 induced jobs

5.3 Wages and Compensation

Labour costs drawn from SBS and Eurostat Labour Cost Index.

6. Fiscal Impact Methodology

Fiscal calculations include:

6.1 Excise Duties

Taken directly from Eurostat's harmonised excise database.

6.2 VAT

VAT base = price excluding excise.

$$VAT = Base\ Price \times VAT\ Rate$$

6.3 Labour Taxes

From labour cost data:

- employer contributions
- employee contributions
- personal income tax proxies

6.4 Corporate Income Taxes

Applied to sectoral profits from S&P Global.

7. Trade Analysis Methodology

Trade competitiveness assessed using:

7.1 Market Share Calculations

$$Share_{value} = \frac{Exports_{EU}}{Exports_{World}}$$

7.2 Unit Value (UV) Analysis

UV = value ÷ quantity

Indicates product complexity and quality.

7.3 Structural Indicators

- revealed comparative advantage
- diversification index
- import penetration ratio

7.4 Time-Series Trends (2014–2023)

Used to show EU's declining or strengthening position.

8. Illicit Market Estimation Techniques

Illicit market size estimated using:

8.1 Trade Gap Method

$$Illicit = Exports_{reported\ by\ China} - Imports_{reported\ by\ EU}$$

8.2 Price-Driven Elasticity Model

Illicit participation:

$$L = \omega_0 + \omega_1(P_{legal} - P_{illicit}) + \omega_2 Enforcement$$

8.3 Consumption Discrepancy Analysis

Comparing:

- national consumption surveys
- legal tax-paid sales

8.4 Sensitivity Analysis

Ranges reflect uncertainty.

9. Behavioural and Demand Modelling

9.1 Price Elasticities

Typical EU values:

- cigarettes: −0.45
- heated tobacco: −0.25
- e-cigarettes: −0.40
- pouches: −0.20

9.2 Cross-Price Elasticities (Substitution)

Cigarettes → heated tobacco: +0.20

Cigarettes → e-cigarettes: +0.10

9.3 Discrete Choice (Logit) Model

Utility function:

$$U_i = \alpha_i - \beta P_i + \gamma Z + \varepsilon$$

Market shares:

$$s_i = \frac{e^{U_i}}{\sum_j e^{U_j}}$$

Used for switching simulations.

10. Glossary of Technical Terms

GVA – Gross Value Added

I/O Model – Input–Output model

MPC – Marginal Propensity to Consume

Elasticity – Sensitivity of quantity demanded to price

Leontief Inverse – Matrix capturing economic ripple effects

Cross-Price Elasticity – How demand for one product responds to price changes in another

Unit Value – A proxy for product sophistication

Induced Impact – Consumption-driven impact from wages

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