

METHODOLOGY

Estimating Illicit Flows of Cigarettes
and the Impact of Enabling Factors

7 ITTP NEXUS
IN EUROPE
AND BEYOND

2019

METHODOLOGY

Estimating Illicit Flows of Cigarettes and the Impact of Enabling Factors

Acknowledgements and credits

This booklet is part of the *ITTP NEXUS in Europe and Beyond* Report. This report was prepared by a Research team of Transcrime, Joint Research Center on Transnational Crime of the Università Cattolica del Sacro Cuore, the Alma Mater Studiorum Università di Bologna and the Università degli Studi di Perugia, under the supervision of Ernesto U. Savona, Director of Transcrime.

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Suggested citation: Meneghini, Cecilia and Marco Dugato. 2019. "Methodology - Estimating Illicit Flows of Cigarettes and the Impact of Enabling Factors". In *ITTP NEXUS in Europe and Beyond*, edited by Alberto Aziani and Marco Dugato. Milano: Transcrime – Università Cattolica del Sacro Cuore. © 2019

ISBN: 978-88-99719-20-3

The Research team of Transcrime acknowledges the invaluable contributions and advice provided by representatives of law enforcement agencies, customs, academics and researchers.

The project Nexus is financed by PMI IMPACT, a global grant initiative of Philip Morris International, to support projects dedicated to fighting illegal trade and related crimes (<https://www.pmi-impact.com/>).

This publication reflects the views only of the Authors and of the Research team.

Preface

Cigarette trafficking is a global and complex crime. In the EU MSs, 40 billion illicit cigarettes are consumed originating from 128 countries spread across five continents. Most of these cigarettes originate from non-EU countries where cigarette prices are low, and there are weaknesses in the law enforcement, control, and regulatory systems.

Like cigarette trafficking itself, research on the topic must extend beyond national and regional borders. This transnational dimension calls for an analysis that considers the interaction between multiple countries to reveal, understand, and monitor cigarette trafficking in the EU. In particular, it should account for a wider context including the non-EU countries that are involved in the production, transit and consumption of illicit cigarettes. Only the combination of local and macro-regional perspectives enables the identification of the main factors behind the transnational illicit flows of cigarettes and the designing of effective policies to curb them.

In light of these considerations, *ITTP NEXUS in Europe and Beyond* includes an analysis of the illicit flows of cigarettes moving through EU countries, by also examining the role of and the connections with

relevant countries in North Africa, the Middle East, and Central Asia. The project identifies and quantifies these flows and highlights the existing connections within political, legislative and socio-economic frameworks. Through this process, *ITTP NEXUS in Europe and Beyond* provides an assessment of the enabling factors behind transnational cigarette trafficking.

The *ITTP NEXUS in Europe and Beyond* Report is presented in the form of 7 booklets, each focusing on a specific aspect of cigarette trafficking. Booklet 1 provides an overview of the main characteristics of the transnational cigarette trafficking network in Europe and beyond. Booklets 2, 3, 4 trace and explain the trafficking of cigarettes along the three main routes targeting European markets. These booklets are divided by route: Booklet 2 – the North-Eastern Route; Booklet 3 – the Extended Balkan Route; Booklet 4 – the Maghreb Route. Booklet 5 discusses the contextual factors and drivers behind cigarette trafficking and its evolution over time, relying on original estimates and analyses. Based on the total results of the analysis from Booklets 1-5, Booklet 6 puts forward policy implications to tackle the transnational illicit flows of cigarettes, overcome regulatory

gaps, and develop preventive measures for the reduction of specific risk-factors. Finally, Booklet 7 concludes the Report by detailing the methodological approach adopted to determine the estimates and analyses presented in this booklet series.

The results emerging from *ITTP NEXUS in Europe and Beyond* emphasise the importance of an integral and multilateral approach which involves multiple countries and simultaneously considers the demand, supply, and transfer of illicit cigarettes. The aim of the Report is to increase awareness about cigarette trafficking and its magnitude at regional and international levels. At the same time, the project's findings could be used to anticipate future scenarios, thus assisting governments and other stakeholders to forecast and prevent crime and to orient and support their regulatory choices. Finally, the comprehensive methodological approach suggested by this project could potentially be used for analysing other transnational illicit markets and criminal activities.

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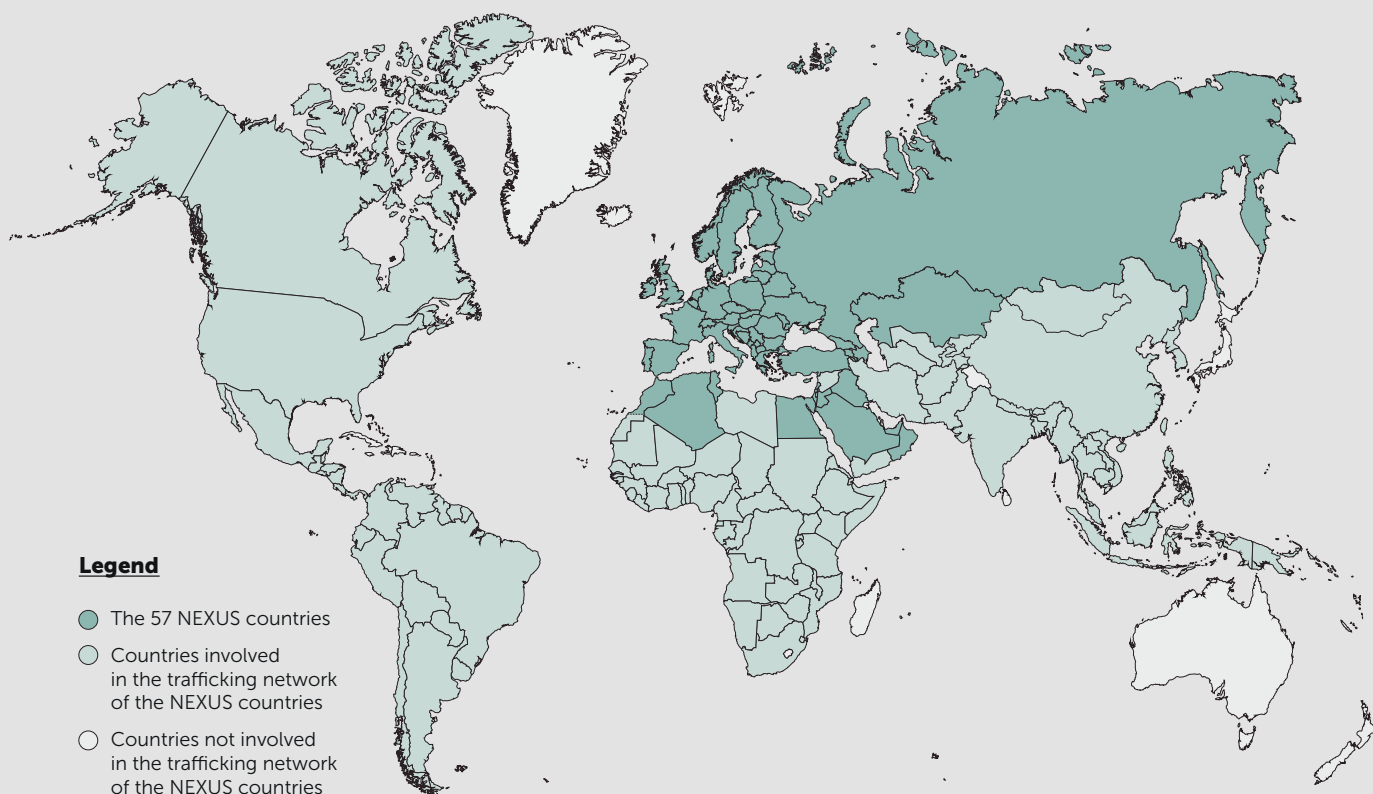
Explanatory notes

All analyses contained in the *ITTP NEXUS in Europe and Beyond* Report are based on the original estimates produced by Transcrime unless otherwise indicated by the reported references.

The following abbreviations have been used in this booklet:

EPS	Empty Pack Survey
EU	European Union
FAME	Flows, Actors, Modus operandi, law Enforcement database
LEA	Law Enforcement Agency
RC	Releases for Consumption

The 57 NEXUS countries



Introduction

This booklet constitutes the seventh chapter of the *ITTP NEXUS in Europe and Beyond* Report. It describes the approach applied to estimate the illicit flows of cigarettes and to identify and analyse their enabling factors. The approach comprises three phases:

1. estimating the volume of the illicit markets of cigarettes in the 57 countries included in the analysis;
2. mapping the network of transnational illicit flows of cigarettes;
3. identifying the impact of contextual factors on illicit flows of cigarettes.

Each section of the booklet focuses on one of the phases. Information is provided on how the quantitative data and qualitative information are exploited in each phase.

1. Estimating the size of the national illicit cigarette markets

The first phase of the methodology estimates the consumption of illicit cigarettes in 57 countries located in Europe, North Africa, the Middle East and Central Asia.

The methodology involves two main steps:

1. **assessment of the overall consumption of cigarettes**—both licit and illicit—in all the markets of interest, by employing a supply-side estimation approach;
2. **estimation of the share of legitimate and illicit cigarettes** (i.e., counterfeits, illicit whites, smuggled legitimate cigarettes) within the overall number of cigarettes consumed in each country.

Step 1 – Estimating the overall consumption of cigarettes

The total consumption of cigarettes in each country for each year (2008–2017) is estimated as follows.

At the global level, the estimate of the total consumption emerges as the difference between the overall production of cigarettes—both legal and illegal—and the aggregate of seizures. The estimate of the total consumption is based on data on Releases for Consumption (RC) of cigarettes and seizures (see Table 1).

To produce national estimates of consumption, the inflows and outflows of cigarettes between countries have to be taken into account. Specifically:

- **'inflows'** are cigarettes consumed in a specific country that were originally intended for sale in another country;
- **'outflows'** are cigarettes intended for the same given country, but which ended up being smoked abroad.

Table 1. Data sources for the estimate of total cigarette consumption

Data	Description	Source	Geographic coverage	Time span
Releases for consumption of cigarettes	Registered sales of domestic cigarettes	European Commission, "Excise Duties" (for EU 28); ¹ Tobacco industry (for other countries)	All 57 countries	2008-2017
Empty Pack Surveys (EPSs)	Results from surveys collecting and analysing discarded empty cigarette packs, which are used to estimate the share of domestic, non-domestic and counterfeit packs in each market	Tobacco industry	All 57 countries	2008-2017*
Seizures	Volume of cigarettes seized by law enforcement authorities by country of cigarette origin	Official data published on different national online sources (e.g. customs and LEAs websites, reports); Tobacco industry	All 57 countries	2008-2017*

Note: * indicates that data are missing for some countries for some years included in the indicated time span. Missing data have been imputed through linear interpolation or replacement with closest available data point in case the data was missing for either 2008 or 2017.

The proposed approach considers the international trade in cigarettes as a semi-closed system in which inflows can come from any country in the world, but outflows can target only the 57 countries included in the analysis.

To build the semi-closed system, the applied method combines data from Empty Pack Surveys (EPSs) with estimates of national production based on Releases for Consumption (RC) of cigarettes and seizures.

EPSs yield data on the share of domestic and non-domestic cigarettes (i.e., inflows) consumed

in a market. When using EPSs results, information on inflows can be expressed as a share of the total consumption of the country under investigation. Outflows can be expressed as a share of the total consumption of other countries.

RC provide the size of the cigarette production in each country.

Combining EPSs data with data on RC makes it possible to convert the shares extracted from EPSs into volumes of consumed cigarettes.

Step 2 – Estimating the share of legitimate and illicit consumption

EPSs data, together with other information (see Table 2), are used to subdivide the total consumption volumes into various components:

- illicit consumption:
 - counterfeits;
 - illicit whites;
 - contraband legitimate cigarettes;
- legal consumption:
 - domestic;
 - non-domestic.

Table 2. Data source for the estimate of the share of illicit consumption

Data	Description	Source	Geographic coverage	Time span
Smoking prevalence	% of population aged 15 or over consuming tobacco products	Eurobarometer; ² Euromonitor ³ International; ⁴ World Health Organization; Tobacco industry	All 57 countries except Iraq, Kosovo, Kuwait and Montenegro	2008-2017*
Average daily cigarette consumption	Average number of cigarettes smoked per day among daily cigarette smokers aged 15 or over	Eurobarometer (multiple reports); ⁵ Ng et al. 2014 ⁶	All 57 countries except Kosovo	EU countries: 2009; 2012; 2014; 2017. Other countries: 2012 only
Legal cigarette prices	Price of cheapest, most sold and premium (or Marlboro) cigarette brand	Tobacco industry; Online open sources	All 57 countries and other countries generating inflows into the 57 ^a	2008-2017
Inbound flow of tourists/visitors by country of residence	Number of tourists/visitors arriving at national borders/in accommodation establishments broken down by their country of residence ^b	UN World Tourism Organization ⁷	All 57 countries except Iraq, Kosovo and UAE	2012-2016
Average length of stay	Ratio between the total overnight stays in hotels/all types of accommodation establishments and the number of arrivals of tourists in hotels/all types of accommodation establishments	UN World Tourism Organization ⁸	All 57 countries except Ireland, UK, Albania, Belarus, Egypt, Georgia, Iraq, Israel, Jordan, Kazakhstan, Kosovo, Kuwait, Lebanon, Oman, Russia, Saudi Arabia, Ukraine and UAE	2012-2016

a. Information on prices is needed for more countries to evaluate whether the price differential could trigger contraband practices.

b. Three types of data are available (depending on the country of reference): arrivals of non-resident tourists at national borders (by country of residence), arrivals of non-resident visitors at national borders (by country of residence), and arrivals of non-resident tourists in all types of accommodation establishments. The different data have been merged to construct a single indicator for the inflow of tourists/visitors.

Data	Description	Source	Geographic coverage	Time span
Commuters	Number of resident workers who commute daily cross-border for work, by country of work	Eurostat ⁹	EU 28	2008-2017
Number of packages bought on trips to lower-price countries	Mean of the answers to the following survey question: "In the last 12 months when you last came back from a trip to another EU country, how many packs or cartons of lower price cigarettes did you bring home with you?"	Eurobarometer ¹⁰	EU 28 except Croatia, Norway	2008
Residents of border regions	Population of NUTS3 areas bordering other countries, by bordering country	Eurostat ¹¹	EU 28	2008-2017
Citizens who are usually residents in another country	Number of residents of a country who are citizens of a different country, by country of citizenship	Eurostat ¹²	EU 28	2016-2017
Duty-free allowance	Maximum number of cigarettes that can be legally brought into a country from abroad	Customs and travel websites	All 57 countries	2008-2017

Note: * indicates that data are missing for some countries for some years included in the indicated time span. Missing data imputation strategies have been implemented in these cases. Whenever the cited source did not directly provide the data for a particular country, alternative estimation approaches have been implemented, such as an estimate based on the average value in neighbouring countries (e.g., for the smoking prevalence). Alternative estimation approaches needed to be applied only for a very limited number of countries out of the total 57 countries included in the analysis.

The following subsections present the methodology to estimate the various components of the market.

Counterfeits

In each country considered, **the share of counterfeit emerges directly from EPSs**. The forensic analysis of the packs allows the status of each pack to be categorised as genuine or counterfeit.^c

Illicit whites

Illicit whites are cigarettes manufactured legally in a country but intended for smuggling into other countries where they usually

have limited or no legal market. While their export may occur legally—or may not—and taxes in manufacturing countries are usually paid, their import into and sale in destination countries is always illegal and takes place without the payment of applicable taxes.¹³

Relying on this definition of illicit whites, **the methodology uses information from EPSs to identify brands of illicit whites**. Given a brand with a domestic legal market in one of the countries included in the analysis, the brand is identified as an illicit whites brand if its share of legal domestic consumption is

disproportionally low compared to its global share of non-domestic consumption in other countries. This follows from the fact that illicit whites are purposely produced for the illegal market of a foreign country.¹⁴ Brands whose origin is 'Duty-Free' or 'Unspecified' in the majority of cases are also flagged as illicit whites.^d

Most brands identified as illicit whites by this methodology have overall low consumption volumes and mainly originate from non-EU countries. Overall, the vast majority of the brands identified as illicit whites were already reported in existing lists of illicit whites brands, and vice versa.¹⁵

c. Only the manufacturers cooperating with each specific EPS conduct forensic analyses. As consequence, the final estimate of the prevalence of counterfeits might under-represent the actual consumption of counterfeit cigarettes. The overall potential bias is likely to be small, given that counterfeits constitute a residual share of the total illicit market for the great majority of countries.

d. In particular, brands have been considered as illicit whites whenever the origin of the pack was 'Duty-Free' or 'Unspecified' in more than half of the sample. The results obtained overlap with existing lists of illicit whites brands (e.g., KPMG 2017).

Once illicit whites brands are identified, the share of their consumption within each country is derived and translated into volumes exploiting the results on total consumption.

Contraband of genuine cigarettes and legal purchase of non-domestic cigarettes

Contraband flows are calculated by subtracting transnational legal inflows from the total inflows as estimated in Step 1.

Non-domestic packs are either legally carried from their country of sale to their country of consumption, or they are illegally smuggled into the country where they are consumed (i.e., contraband).

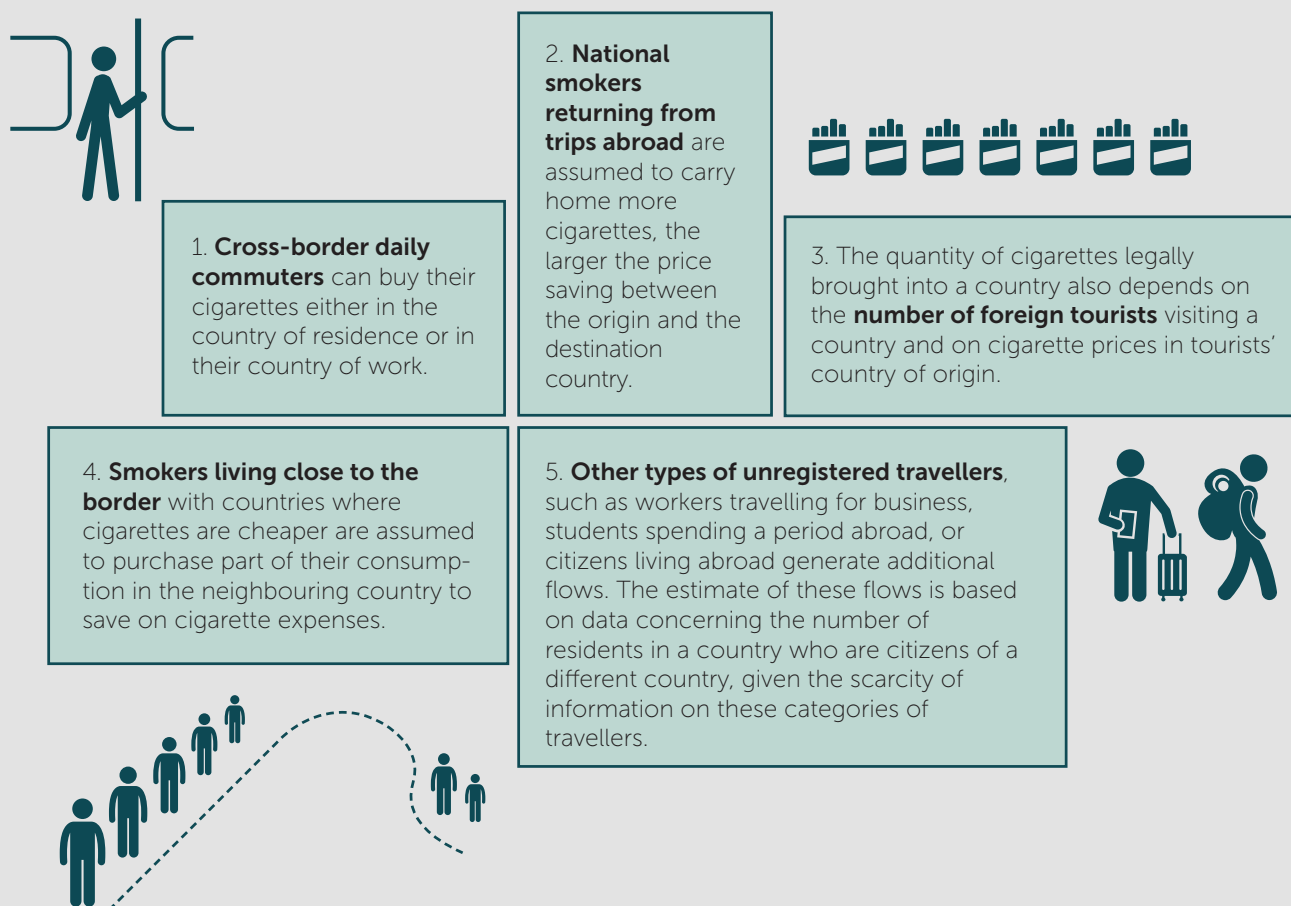
Transnational legal inflows have been estimated by relying on multiple data sources to account for different types of cross-border journeys and different quantities of carried cigarettes depending on the type of cross-border flow (see Table 2).

For EU countries, **legal cigarette inflows are broken down into five main categories** (see Figure 1).

For non-EU countries, the decomposition of the flows relies only on elements 2 and 3, due to lower data availability.^e

The different legal non-domestic flows are then merged together and subtracted from the overall inflows to estimate illegal transnational flows of cigarettes.

Figure 1. Types of legal cigarette inflows



e. The rigidity of this assumption is partially mitigated by the fact that these countries are not part of the Schengen agreement, causing the number of individuals making frequent trips to neighbouring countries to be much lower.

2. Mapping the transnational illicit flows of cigarettes

The first phase of the methodology yielded an estimate of the volume of illicit cigarettes produced in country O (origin country) and consumed in country D (destination country). The second phase of the methodology consists in mapping the transnational illicit flows of cigarettes. Specifically,

the aim of this second phase is to identify each step of the path followed by illicit cigarettes when moving from country O to country D.

The methodology developed to map illicit cigarette flows relies on multiple types of information (see Table 3):

1. evidence of illicit cigarettes flowing between any two countries:
 - seizure cases (see Box 1);
 - evidence of illicit consumption of cigarettes from the same origin country;
2. geographical information on the countries' location and characteristics.

Table 3. Data sources for the mapping of illicit cigarette flows

Indicator	Information Category	Variable	Source
Frequency of seizures of cigarettes	Seizure cases	Number of seizures carried out by law enforcement authorities of cigarettes entering country B and coming from country A	Crime&tech database on "dyads in the illicit network of cigarette trafficking"
Volume of cigarettes seized	Seizure cases	Share of the volume of cigarettes entering country B and coming from country A (over the total volume seized in the two countries)	Crime&tech database on "dyads in the illicit network of cigarette trafficking"
Volume of seized cigarettes originating from a specific country	Seizure cases	Share of the volume of cigarettes originating from country O and seized along the border between country A and country B (over the total volume seized in the two countries)	Crime&tech database on "dyads in the illicit network of cigarette trafficking"
Volume of consumed illicit cigarettes originating from a specific country	Evidence of illicit consumption	Volume of illicit cigarettes consumed in B and originating from O	Transcrime elaborations of EPS data
Share of consumed illicit cigarettes originating from a specific country	Evidence of illicit consumption	Share of illicit cigarettes consumed in B (of the total cigarette consumption of B) originating from O	Transcrime elaborations of EPS data
Similarity in the structure of illicit consumption	Evidence of illicit consumption	Euclidean distance between the structure of illicit consumption in country A and B (in terms of shares of illicit whites, contraband and counterfeits consumed on the total illicit consumption)	Transcrime elaborations of EPS data
Geographical distance from the destination country	Geographical structure	Geographical distance between country B and final destination D	CEPII ¹⁶

Indicator	Information Category	Variable	Source
Geographical distance between any pair of countries	Geographical structure	Geographical distance between country A and country B	CEPII ¹⁷
Length of borders (in case of contiguous countries)	Geographical structure	Length of the border between country A and country B (if A and B are contiguous)	Crime&tech calculations based on geospatial open data

Note: O refers to the country of origin of the cigarettes, and D to the final destination where they are consumed. For each dyad, A refers to the country from which cigarettes flow and B to the country to which they flow.

To rely on a larger and richer number of information on seizure cases, in addition to seizures of cigarettes also seizures of other tobacco products (e.g., hand-rolling tobacco, pipe tobacco) have been considered. Opportune transformations have been performed to merge the volumes of different products.

Box 1. Dyads in the illicit network of cigarette trafficking database

The *Dyads in the illicit network of cigarette trafficking* database collected a sample of seizure cases to identify the steps of the illicit flows of cigarette originating from, traversing, or reaching the 57 NEXUS countries. Information on the sample of seizure cases necessary for the reconstruction of the cigarette trafficking network was retrieved from available open sources reporting seizure cases of cigarettes and other tobacco products over the period of interest (2008-2017).

Information was collected from three main sources:

- online press articles gathered from two news repositories, i.e. LexisNexis and ProQuest;

- press releases and annual reports of national law-enforcement agencies;
- the updated version of the FAME database developed by Transcrime in 2014.

The data collection was implemented with the aim of obtaining a large sample of the totality of seizures carried out by law enforcement authorities in the area of interest. The procedure was not designed to gather information on the whole population of seizure cases that occurred in the 57 countries between 2008 and 2017. Once retrieved from the sources, information on the dyads was analysed and systematised in the dataset, where each line represents an illicit movement between a dyad of countries. For each illicit

movement, the research team coded the following information:

- details about the countries and cities (when available) from which seized cigarettes and tobacco products were outflowing and those to which they were inflowing;
- information on the origin country of the products;
- quantity and type of cigarettes and other tobacco products seized;
- date and location of the seizure;
- means of transportation used;
- actors involved (number, nationality and age).

The total number of identified illicit movements included in the final exploited sample was 4,248.

The use of geographical information to map the flows is based on the assumption that **illicit trafficking shares some basic principles of geographical convenience with licit transport methods** (e.g., all other factors being equal, traffickers will choose to follow the fastest route to go from X to Y).

A value for each described variable is assigned to each pair of countries (e.g., country A and country B) for all the possible combinations of origin of the cigarettes (country O) and final

destination where the cigarettes are consumed (country D). The variables are then combined by means of an appropriate function into a single value.

The combination of geographic information and data providing evidence of illicit cigarettes flowing between any pair of countries makes it possible to assign a **“distance value” to any pair of countries representing the cost of moving illicit cigarettes** between them.

Then, considering the volume of illicit cigarettes originating in country O and consumed in country D, **the methodology relies on an algorithm that searches for the most likely paths from O to D**. The algorithm identifies all the possible paths and ranks them on the basis of the likelihood that cigarettes follow that specific path. The volume of illicit cigarettes is then redistributed among the paths proportionally to the estimated likelihood.

3. Estimating the impact of contextual factors on illicit cigarette flows

The third phase of the methodology identifies the contextual factors impacting on illicit cigarette flows; it then estimates their influence on the traffic itself. **This phase exploits information pertaining to six macro dimensions:**

- political;
- geographical;
- regulation and enforcement;
- socio-economic;
- cultural;
- criminal.

Within each macro dimension, two types of analyses are conducted:

1. A quantitative analysis that exploits both country-level variables and relational variables within the various macro dimensions to run a statistical model estimating the impact of these variables on illicit cigarette flows.
2. A qualitative analysis relying on information collected from the academic literature, grey literature, open sources (e.g., press releases, news) and interviews.

Evidence yielded by the two sets of analyses is then merged to provide an overall interpretation of the explanatory factors behind the transnational trafficking of cigarettes.

Quantitative analysis of the contextual factors

The **quantitative analysis relies on econometric models that estimate the impact of contextual factors** (independent variables) on the volume of cigarettes flowing between any pair of countries (dependent variable).

The models are cross-sectional because the units of analysis are the illicit flows of cigarettes moving between countries. At the same time, the analysis has a longitudinal component as two models are estimated at different points in time:

- 2008-2012 (relying on the annual average values of all variables over this five-year period);^f
- 2017 (last available year).

f. The choice of estimating the model over 2008-2012 has the aim of smoothing the impact of missing data points on the estimated effect of contextual factors.

The **dependent variable** of the model **is the size of the illicit flows connecting pairs of countries**: from country A (outflowing country) to country B (inflowing country) (see Table 4). The model accounts for the fact that country A and B could have different roles in the network of cigarette trafficking, i.e.:

- country A can be either the origin country or a transit country;
- country B can be either the destination country or a transit country.

Relying on the 6 macro dimensions mentioned above, the methodology identifies several **contextual factors** and operationalises them through variables available open source (see Table 5). These variables are the **independent variables** of the econometric model. They can be divided into two types:

1. variables referring to the pair of countries A-B (e.g., the length of the border between A and B);
2. variables referring to a single country (e.g., the unemployment rate in a country). In this case, the model includes the value for the variable in the outflowing country (e.g., the unemployment rate in country A) and in the inflowing country (e.g., the unemployment rate in country B).

Using the dependent and independent variables described, **a two-part model is estimated**. A two-part model is an econometric model accounting for the presence of many zeros in the dependent variable, as is the case with illicit flows of cigarettes. Indeed, given all the possible combinations of A-B flows where A and B can be any country in the world, most of these flows are actually zero. A two-part model

accounts for this skewed distribution of the dependent variable by splitting the estimation into two parts:

1. estimation of the probability of observing a positive value for the dependent variable compared to observing 0;
2. conditional on observing a positive outcome, estimation of the impact of each independent variable on an increase in illicit cigarette flows—the dependent variable.

The estimated effect of each contextual factors in the two parts is then combined to obtain the total impact of each variable on the volume of illicit cigarette flows.

Table 4. Descriptive statistics of the dependent variable, by type of flow

Type of flow	N. of observations	Mean volume (sticks)	St. Dev.	Min volume (sticks)	Max volume (sticks)
<i>Origin country - Destination country</i>	18,885	3,131,325	87,502,452	0	4,864,134,051
<i>Origin country -Transit country</i>	19,454	5,034,306	59,118,757	0	3,591,473,456
<i>Transit country -Transit country</i>	19,607	14,376,187	109,096,125	0	3,111,844,926
<i>Transit country - Destination country</i>	18,888	5,185,165	62,249,303	0	2,625,312,281

Table 5. Data sources for the quantitative analysis of the contextual factors

POLITICAL FACTORS				
Indicator	Variable	Source	Geographic coverage	Time span
Ongoing armed conflicts	Number of active conflicts (at least 25 battle-related deaths in the year)	Uppsala Conflict Data Program ¹⁸	All world countries	2008-2017
GEOGRAPHICAL FACTORS				
Indicator	Variable	Source	Geographic coverage	Time span
Length of the border	Length of the border between country A and country B (if A and B are contiguous)	Crime&tech calculations based on geospatial open data	All world countries	N.A.
Landlocked country	Dummy variable for whether a country is landlocked	CEPII ¹⁹	All world countries	N.A.
ECONOMIC AND SOCIO-ECONOMIC FACTORS				
Indicator	Variable	Source	Geographic coverage	Time span
Price differential	Difference in the price of a pack of the most sold cigarette brand between country A and country B	Tobacco industry	All 57 countries and other countries generating inflows into the 57	2008-2017
Shadow economy	Size of the shadow economy as a % of the GDP	Medina and Schneider 2017 ²⁰	All world countries	2008-2015
Colonial relationship	Dummy for whether countries shared a colonial relationship (colony-coloniser or had a common coloniser)	CEPII ²¹	All world countries	N.A.
Common language	Dummy for whether countries share a common language (spoken by at least 9% of the pop. or official language)	Melitz and Toubal 2014 ²²	All world countries	N.A.
Legal trade	Trade value (in US\$) of imports and exports of all types of commodities from country A to country B	UN Statistics Division ²³	All world countries	2008-2017
Unemployment	Number of unemployed individuals as a % of total labour force	The World Bank ²⁴	All world countries	2008-2017
GDP	Gross Domestic Product of a country	The World Bank ²⁵	All world countries	2008-2017
Urban population	Number of individuals living in urban areas as a % of total population	The World Bank ²⁶	All world countries	2008-2017
CRIMINAL FACTORS				
Indicator	Variable	Source	Geographic coverage	Time span
Corruption	Control of corruption indicator	The World Bank ²⁷	All world countries	2008-2016
Terrorist attacks	Number of terrorist attacks	National Consortium for the Study of Terrorism and Responses to Terrorism (START) ²⁸	All world countries	2008-2017

Note: Missing data imputation strategies have been implemented whenever the cited source did not provide data for all the years included in the analysis. The impact of regulation and enforcement factors and cultural factors has been estimated through a qualitative analysis due to difficulties in the operationalisation of the related contextual factors.

Qualitative analysis of the contextual factors

The qualitative analysis of the contextual factors consisted of a literature review on factors enabling illicit cigarette flows, which in a second phase was corroborated by interviews with experts on the topic.

The qualitative analysis had three main goals:

1. supporting the quantitative analysis in the **identification of the enabling factors** shaping the transnational network of illicit cigarette trafficking (principally regarding regulation and enforcement and cultural factors);
2. **uncovering** the specific **mechanisms linking these factors with changes in the volume of cigarettes** trafficked;
3. **deepening the understanding of the enabling factors with specific regard to the three main routes** identified by the analysis—the Maghreb Route, the North-Eastern Route and the Extended Balkan Route—and to the main flows along these routes.

The review considered different types of sources:

- academic literature: scientific works published in scientific journals;
- grey literature: informally published documents such as publications by private or public organisations, technical and research reports, research projects, graduation and PhD theses, presentations for conferences and seminars;
- news articles: contents published by newspapers and intended for a general audience;

- press releases: written communications directed at members of the news media for the purpose of announcing seizure cases or investigative operations by LEAs and customs;
- interviews with experts: scholars, law enforcement agents, officers of international institutions.

Academic and grey literature

The **academic and grey literature review** considered documents published from 2008 to 2017.

Relevant sources were identified through the following **digital means**:

- Google search engine;
- Google Scholar;
- Scopus database;
- JSTOR database;
- criminal justice abstract database;
- online library catalogue of the Università Cattolica del Sacro Cuore.

The following **keywords** were used to search for the relevant documents within the above-mentioned digital means:

- cigarette smuggling;
- tobacco smuggling;
- cigarette contraband;
- tobacco contraband;
- counterfeit cigarettes;
- counterfeit tobacco.

Keywords were translated into the official spoken language of each EU country as well as into Arabic, Belarussian, Russian, Serbian, Turkish and Ukrainian to cover all the 57 countries included in the analysis.

The total number of documents found was 750.

Press articles

The **press articles review** considered online press articles published from 2008 to 2017 in the 57 countries included in the analysis.

The articles were collected from two of the largest online news depositories:

- ProQuest - <http://www.proquest.com/>;
- LexisNexis - <https://www.lexisnexis.com/en-us/gateway.page>.

The articles were automatically identified by applying the following query: *(seizure OR seized) AND (tobacco OR cigarette) AND (smuggling OR trafficking OR contraband OR counterfeit OR "smuggled cigarette" OR "smuggled tobacco" OR illicit trade)*

The query was translated into all the languages available in the two repositories and validated by native speakers.

The total number of articles collected was 2,496 (see Figure 2).

Press releases

The **press releases review** considered the online press releases published on national and institutional websites from 2008 to 2017. The focus was mainly on countries with limited information available (see Table 6). The words "cigarette" and "tobacco" were used to search the releases on the websites.

The total number of press releases collected was 474.

Figure 2. Steps followed to collect online press articles

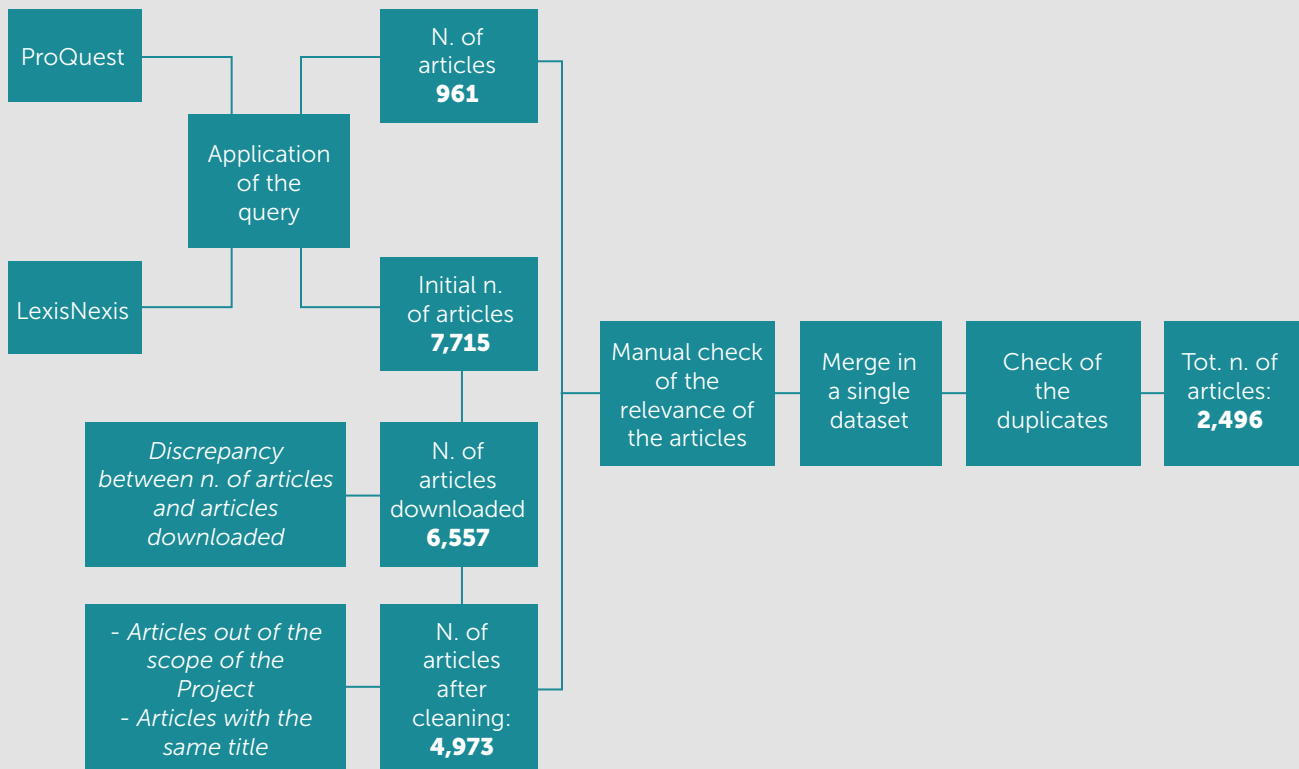


Table 6. List of institutional websites consulted to gather press releases

Country	Authority/Institution	Website
Bosnia and Herzegovina	Border Police	www.granpol.gov.ba
Bulgaria	Customs Agency	www.en.customs.bg
Croatia	Ministry of Finance – Customs Administration	www.carina.gov.hr
Cyprus	Ministry of Finance	www.mof.gov.cy
Estonia	Tax and Customs Board	www.emta.ee
Finland	Customs	www.tulli.fi
Georgia	Revenue Service	www.rs.ge
Gibraltar (UK)	HM Government of Gibraltar	www.gibraltar.gov.gi
Hungary	National Tax and Customs Administration	www.nav.gov.hu
Israel	Ministry of Finance – Israel Tax Authority	www.taxes.gov.il
Kosovo	Ministry of Finance – Kosovo Customs	www.dogana.rks-gov.net/en/
Luxembourg	Administration des douanes et accises	www.do.gouvernement.lu
North Macedonia	Ministry of Finance – Customs Administration	www.customs.gov.mk
Moldova	Customs Service	www.customs.gov.md
Morocco	Administration des douanes et impôts indirects	www.douane.gov.ma
Norway	Customs	www.toll.no
Romania	National Agency for Fiscal Administration – General Customs Direction	www.customs.ro
Saudi Arabia	Saudi Customs	www.customs.gov.sa
Serbia	Ministry of Finance - Customs Administration	www.upravacarina.rs/en/
Slovakia	Financial Administration	www.financnasprava.sk

Glossary

The following terms have been used in the present booklet with the following meaning:

Bootlegging: the legal purchase of tobacco products in a low-tax country and their illegal retail in a high-tax country. Bootlegging concerns individuals or small groups who smuggle small quantities of cigarettes, taking advantage of tax differentials, with the aim of making extra income.²⁹

Contraband or smuggling: the unlawful movement or transportation of cigarettes from one tax jurisdiction to another without the payment of applicable taxes or in breach of laws prohibiting their import or export.³⁰

Counterfeits: cigarettes illegally manufactured and sold by a party other than the original trademark owner. Counterfeits can be sold in the source country or smuggled into another country, both without paying taxes.³¹

Destination country: country in which illicit cigarettes originating in another country are finally consumed.

Domestic cigarettes: cigarettes that originate from the same market in which they are consumed.

Domestic whites: domestic cigarettes that are priced below the minimum tax yield. These cigarettes are treated as having not been legally sold in the country in question.³²

Duty-free cigarettes: cigarettes bought without payment of customs or excise duties. Consumers may buy duty-free cigarettes when travelling into or out of the EU (including Switzerland and Norway) by land, air or sea at legal duty-free shops.³³

Empty pack survey (EPS): survey collecting and analysing empty cigarette packs to estimate the share of domestic, non-domestic and counterfeit packs in each country.

Flow: the movement of cigarettes between two countries.

Illicit whites: cigarettes manufactured legally in a country but intended for smuggling into other countries where they usually have limited or no legal market. While their exportation may occur legally—or may not—and taxes in manufacturing countries are usually paid, their import into and sale in destination countries is always illegal and takes place without the payment of applicable taxes.³⁴

Inflow: the inward flow of cigarettes.

Law enforcement agencies (LEAs): governmental and international agencies responsible for the enforcement of the laws; with respect to cigarette trafficking, international and national Police and Customs that coordinate, support and conduct anti-cigarette smuggling actions. Eurojust, Europol, Frontex, OLAF, Interpol and the World Customs Organization are the international and European agencies included in this category.

Non-domestic cigarettes: cigarettes that originate from a market different from the one in which they are consumed. They may be legal if brought into the market legally by consumers, for instance during a cross-border trip, or illegal if brought into the market illegally.³⁵

Origin country: country from which the illicit flow of cigarettes originates.

Outflow: the outward flow of cigarettes.

Path: the ordered sequence of countries through which illicit cigarettes transit while going from their country of origin to their final destination.

Route: the broad combination of paths and flows connecting different macro regions in the transnational trafficking of cigarettes.

Transit country: country through which cigarettes pass to flow from their country of origin to their country of destination.

Unspecified: cigarette packs which do not bear specific market labelling.³⁶

End notes

1. European Commission, "Excise Duties: Cigarettes - Taxation and Customs Union - European Commission," European Commission - Policies, information and services, 2018, https://ec.europa.eu/taxation_customs/business/excise-duties-alcohol-tobacco-energy/excise-duties-tobacco/excise-duties-cigarettes_en.
2. Eurobarometer, "Eurobarometer Survey on Tobacco - Primary Data," Flash Eurobarometer 253 (European Commission, March 2009); Eurobarometer, "Eurobarometer Survey on Tobacco - Primary Data," Special Eurobarometer 332 / Wave 72.3 (European Commission, May 2010); Eurobarometer, "Eurobarometer Survey on Tobacco - Primary Data," Special Eurobarometer 385 (European Commission, May 2012); Eurobarometer, "Eurobarometer Survey on Tobacco - Primary Data," Special Eurobarometer 429 (European Commission, May 2015); Eurobarometer, "Eurobarometer Survey on Tobacco - Primary Data," Special Eurobarometer 443 (European Commission, May 2015); Eurobarometer, "Eurobarometer Survey on Tobacco - Primary Data," Special Eurobarometer 458 (European Commission, May 2017).
3. Euromonitor International, "Smoking Prevalence Dataset (2006-2015)," Euromonitor International, 2015.
4. WHO, "Tobacco Use - Data by Country," 2015, <http://apps.who.int/gho/data/node.main.65>.
5. Eurobarometer, "Eurobarometer Survey on Tobacco - Primary Data," March 2009; Eurobarometer, "Eurobarometer Survey on Tobacco - Primary Data," May 2010; Eurobarometer, "Eurobarometer Survey on Tobacco - Primary Data," May 2012; Eurobarometer, "Eurobarometer Survey on Tobacco - Primary Data," May 2015; Eurobarometer, "Eurobarometer Survey on Tobacco - Primary Data," May 2015; Eurobarometer, "Eurobarometer Survey on Tobacco - Primary Data," May 2017.
6. Marie Ng et al., "Smoking Prevalence and Cigarette Consumption in 187 Countries, 1980-2012," *JAMA* 311, no. 2 (January 8, 2014): 183-92, <https://doi.org/10.1001/jama.2013.284692>.
7. UN World Tourism Organization, "Tourism Statistics," UNWTO eLibrary, 2018, <https://www.e-unwto.org/toc/unwtotfb/current>.
8. UN World Tourism Organization.
9. Eurostat, "EU Labour Force Survey - Micro Data," European Commission, 2018.
10. Eurobarometer, "Eurobarometer Survey on Tobacco - Primary Data," March 2009.
11. Eurostat, "Population on 1 January by Age Group, Sex and NUTS 3 Region," 2018, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=demo_r_pjanaggr3&lang=en.
12. Eurostat, "EU and EFTA Citizens Who Are Usual Residents in Another EU/EFTA Country as of 1 January," 2018, http://ec.europa.eu/eurostat/en/web/products-datasets/-/MIGR_POP9CTZ.
13. KPMG, "Project SUN. A Study of the Illicit Cigarette Market in the European Union, Norway and Switzerland 2016 Results," 2017.
14. Luk Joossens and Martin Raw, "From Cigarette Smuggling to Illicit Tobacco Trade," *Tobacco Control* 21, no. 2 (2012): 230-34, <https://doi.org/10.1136/tobaccocontrol-2011-050205>; Peter H. Reuter and Malay Majmundar, "Understanding the U.S. Illicit Tobacco Market: Characteristics, Policy Context, and Lessons from International Experiences" (Washington: Committee on the Illicit Tobacco Market: Collection and Analysis of the International Experience;

- National Research Council, 2015), <http://www.nap.edu/catalog/19016/understanding-the-us-illicit-tobacco-market-characteristics-policy-context-and>.
15. KPMG, "Project SUN. A Study of the Illicit Cigarette Market in the European Union, Norway and Switzerland 2016 Results."
 16. Thierry Mayer and Soledad Zignago, "Notes on CEPII's Distances Measures: The GeoDist Database," SSRN Electronic Journal, 2011, <https://doi.org/10.2139/ssrn.1994531>.
 17. Mayer and Zignago.
 18. Mihai Croicu and Ralph Sundberg, "UCDP GED Codebook Version 17.2" (Department of Peace and Conflict Research, Uppsala University, 2017).
 19. Mayer and Zignago, "Notes on CEPII's Distances Measures."
 20. Leandro Medina and Friedrich Schneider, "Shadow Economies around the World: New Results for 158 Countries over 1991-2015," CESifo Working Paper Series (CESifo Group Munich, 2017), https://ideas.repec.org/p/ces/ceswps/_6430.html.
 21. Mayer and Zignago, "Notes on CEPII's Distances Measures."
 22. Jacques Melitz and Farid Toubal, "Native Language, Spoken Language, Translation and Trade," *Journal of International Economics* 93, no. 2 (July 2014): 351–63, <https://doi.org/10.1016/j.jinteco.2014.04.004>.
 23. UN Statistics Division, "Trade of Goods (US\$) - Tobacco and Manufactured Tobacco Substitutes," Commodity Trade Statistics Database, 2017, http://data.un.org/Data.aspx?d=ComTrade&f=_l1Code%3A25.
 24. World Bank, "Unemployment, Total (% of Total Labor Force) (Modeled ILO Estimate)," DataBank - World Development Indicators, 2018, [http://databank.worldbank.org/data/reports.aspx?source=2&series=SL.UEM.TOTL.ZS&country=.](http://databank.worldbank.org/data/reports.aspx?source=2&series=SL.UEM.TOTL.ZS&country=)
 25. World Bank, "GDP (Current US\$)," DataBank - World Development Indicators, 2018, [http://databank.worldbank.org/data/reports.aspx?source=2&series=NY.GDP.MKTP.CD&country=.](http://databank.worldbank.org/data/reports.aspx?source=2&series=NY.GDP.MKTP.CD&country=)
 26. World Bank, "Urban Population (% of Total)," DataBank - World Development Indicators, 2018, [http://databank.worldbank.org/data/reports.aspx?source=2&series=SP.URB.TOTL.IN.ZS&country=.](http://databank.worldbank.org/data/reports.aspx?source=2&series=SP.URB.TOTL.IN.ZS&country=)
 27. World Bank, "Worldwide Governance Indicators," 2018, <http://info.worldbank.org/governance/wgi/#home>.
 28. National Consortium for the Study of Terrorism and Responses to Terrorism (START), "Global Terrorism Database [Data File]," 2016, <https://www.start.umd.edu/gtd>.
 29. Elizabeth Allen, "The Illicit Trade in Tobacco Products and How to Tackle It. 2nd Ed." (Washington: International Tax and Investment Center, 2014), 6–7, <http://www.iticnet.org/images/AIT/English-TheIllicitTradeinTobaccoProductsandHowtoTackleIt.pdf>; KPMG, "Project SUN. A Study of the Illicit Cigarette Market in the European Union. 2013 Results" (KPMG, 2014), 3.
 30. Joossens and Raw, "From Cigarette Smuggling to Illicit Tobacco Trade," 230–31; Allen, "The Illicit Trade in Tobacco Products and How to Tackle It. 2nd Ed.," 6; KPMG, "Project SUN. A Study of the Illicit Cigarette Market in the European Union, Norway and Switzerland 2016 Results," 3.
 31. Joossens and Raw, "From Cigarette Smuggling to Illicit Tobacco Trade," 231; Allen, "The Illicit Trade in Tobacco Products and How to Tackle It. 2nd Ed.," 7; KPMG, "Project SUN. A Study of the Illicit Cigarette Market in the European Union, Norway and Switzerland 2016 Results," 3.
 32. KPMG, "Project SUN. A Study of the Illicit Cigarette Market in the European Union, Norway and Switzerland 2016 Results."
 33. KPMG, 3.
 34. Joossens and Raw, "From Cigarette Smuggling to Illicit Tobacco Trade"; KPMG, "Project SUN. A Study of the Illicit Cigarette Market in the European Union, Norway and Switzerland. 2016 Results" (KPMG, 2017), https://www.pmi.com/resources/docs/default-source/pmi-sustainability/project-sun-2017-report.pdf?sfvrsn=cdf89ab5_6.
 35. KPMG, "Project SUN. A Study of the Illicit Cigarette Market in the European Union, Norway and Switzerland 2016 Results," 4.
 36. KPMG, 4.

