Estimating illegal activities in the Italian national accounts[1]

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Introduction

Illegal economy is a relevant phenomenon deserving the application of theoretical instruments and statistical methods to be measured and included in the national accounts estimates. The goal should be reconciling the estimates of economic aggregates in a coherent framework which permits to measure and describe the whole set of economic activities (and their interactions), independently from their being legal, underground or illegal.

The importance of including illegal activities in the estimates of economic aggregates and, consequently, in the estimates of GDP is acknowledged by the European System of Accounts (ESA95) regulation. In this context, the need is to provide an exhaustive, and not distorted, representation of the economic system, further than guaranteeing comparability in time and among member States. Moreover, the inclusion of illegal economy in national accounts is necessary in order to improve the reliability of the GNI calculation, this last indicator used to calculate the amount of own resources of European countries.

The Italian national accountants have developed a general approach to the estimation of illegal activities that follows Eurostat recommendations in terms of methodological approach, quality and reliability of data sources, identification and solution of double counting.

Furthermore, the approach applied assures the integration and the reconciliation of the information between the supply and the demand side within the SUT framework. In some cases, a reliable picture of the phenomenon in terms of a description of the supply chain has been traced to highlight relevant flows to be estimated and inter-connections to be taken into consideration. The result obtained is that the Supply and Use tables are consistent in terms of illegal flows of goods and services and of interaction between illegal and legal flows.

Estimates of economic flows triggered by the production and trade in illegal activities fully utilize the informative sources. Flows have been attributed by-industry to retail and wholesale trade (for illicit drug trafficking and smuggling) and to other personal services (for prostitution). Flows have been attributed by-product as follows: cannabis derivatives to agricultural products; LSD, amphetamines and ecstasy to chemical products; cocaine and heroin to pharmaceutical products; smuggled tobacco to the tobacco products; prostitution to other personal services.

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Double counting of economic flows, generated by illegal activities but already included in the system of accounts has been dealt. This problem, which tends to involve a demand surplus, should derive from a wrong classification (in the aggregate of final consumption) of legal intermediate costs connected with the production of illegal goods and services. However, an integration of production can be necessary if available information does not permit the estimation of the amount of non-observed production that is generated, in the legal economy, as induced (associated) activities of the illegal ones. This is the case of output data of drug illegal activity and, in small terms, of smuggling of cigarettes that are comprehensive of an amount due to the under-coverage of legal production for storage of goods and freight transport by road and by water.

Economic operators involved in illegal activities have been classified as independent workers, whose remuneration is entirely attributed to the mixed income of households as producers.

The paper describes the approach applied to face all the relevant aspects for illegal activities estimation and presents the final results obtained for the reference year 2010.

2. Estimates of the aggregates of drug market

In this section, the reference framework and the procedure for the estimation of the aggregates related to the activities connected with illicit drug trafficking are presented. In particular, the first two paragraph are devoted to provide a reference framework of the Italian drug market and legislation, and a synoptic scheme illustrating the conceptual model and the assumptions that are used in the estimation procedure. In the third paragraph, the informative sources are presented and described. The fourth and fifth paragraphs are devoted to the procedure that permit estimating, respectively, the quantity consumed (starting from the number of consumers), and the economic aggregates.

2.1 Reference framework

In Italy, the production, trafficking and selling of illicit drugs is prohibited by the law. Currently, the law 309/2006, which provided stronger sanctions connected with the production, trafficking and even the use of illicit drugs is not more active.[2] Indeed, in 2013, jurisprudence has gone back to the law of 1990, which provided only administrative sanctions for consumers.[3]

In the context of international drug market, Italy represents a focal point due to the extension of coasts, the peculiar position in the center of the Mediterranean sea, the strong concentration of relevant criminal organizations,[4] and the presence of a wide market of consumers.

Recent studies[5] stressed an increase of international coordination of traffickers, which tend to belong to trans-national criminal groups. Traffickers prevalently use legal

[2] Particularly, the law does not permitted to operate a distinction based on the typology of illicit drugs (heavy or light). The possession and consumption were prosecuted at penal level. The law (Bossi-Fini) has been recently cancelled by the Italian Constitutional Court.

[3] The possession of illicit drug involves just an administrative sanction if it does not exceed the "average daily dose".

[4] According to Europol (2011), Italy is the European Country with the more relevant amount of seizure of illicit drugs.

[5] Emcdda, EU drug markets report. A strategic analysis, 2013.

means of transport such as ships, containers, airplanes, postal services, thus making difficult for contrast authorities to individuate illicit products in a context of a progressive liberalization of international trade.

In the last years, common trends emerged among European Countries in terms of consumption behaviours. Particularly, Italy is characterized by a wide cocaine market and a relevant heroin market. Domestic production can be considered to be irrelevant, while geographical localization and features makes Italy an important territory for cocaine and heroin transit (and, even if to a lower extent, for cannabis).

2.2 An overview of the estimation procedure

The statistical office of the European Commission (Eurostat) recommends the use of the demand-side approach to carry the estimates of the aggregates related to illegal activities.[6] This choice is mainly connected with the low reliability and stability of informative sources needed to develop the supply-side approach (which prevalently utilise seizure data provided by contrast authorities).

Moreover, Eurostat recommends to carry out estimates only for relevant transactions (and relative aggregates). In this context, each country sets the estimation procedures for relevant aggregates according to the typology of market, which can be individuated among a set of more or less complex archetypes.

A preliminary analysis stressed as Italy can be characterized an importer country, with an irrelevant domestic production and a modest but not insignificant share of export (mainly for cocaine, heroin and cannabis derivatives). Consequently, the economic results connected to the trafficking and selling of illicit drugs is considered as trade margin.

Figure 1 shows the synoptic scheme of the estimation procedure that has been adopted.

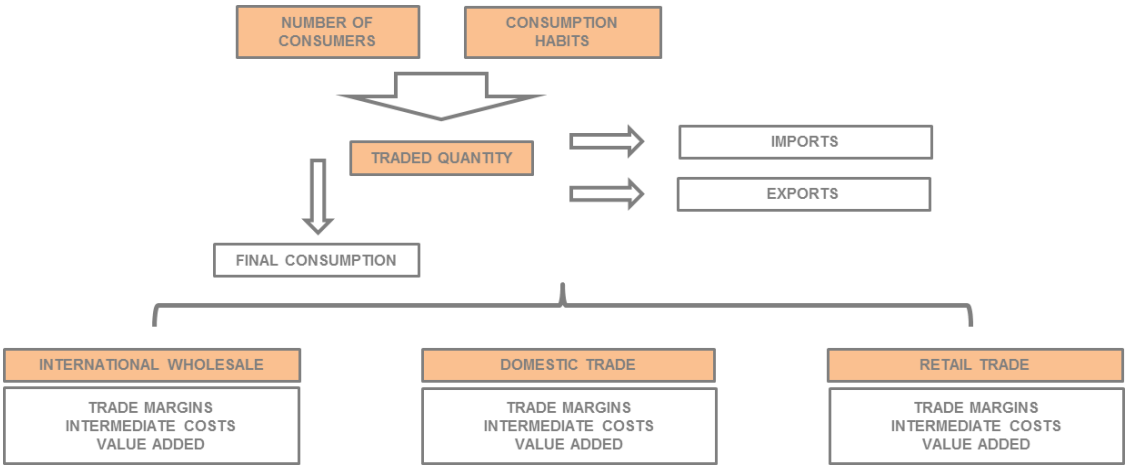

Figure 1: Synoptic scheme of the estimation procedure (Illicit drugs)

The approach is based on the estimate, for each type of illicit drug, of the quantity sold in the domestic market, where it is measured starting from the number of users by type of consumption (problematic, regular, occasional) and the relative consumption behaviour. Once the quantity used in the domestic market is defined, the value of

6 Eurostat (2012).

imports, export and final consumption can be estimated. Finally, based on the magnitude of these aggregates, an estimation of trade margins, intermediate costs, and value added can be obtained for each illicit drug.

To provide estimates coherent with the real structure of the market and to treat in a more accurate way the different economic flows along the supply chain of illicit drugs (and the interaction with the legal economy), the estimation procedure is based on a conceptual model that distinguishes three different steps along the value chain of substances:[7]

- international wholesale trade;
- domestic wholesale trade;
- retail trade.

The estimation procedure is applied to each stage of the supply chain, while relative results are subsequently aggregated to obtain a single value of the trade activity for each illicit drug. Estimates are separately carried out for the following substances: cannabis derivatives, cocaine, heroin, LSD, amphetamine, ecstasy. Data are finally aggregated in order to be included in the Supply and Use tables.

2.3 Data sources

In the last decades, several international agencies have been monitoring drug markets with different goals ranging from control to prevention, to the fight against international crime and terrorism. The United Nation Office for Drug Control and Crime Prevention (UNODC) collects relevant information on the international production and trafficking of illicit drugs. UNODC proposes an integrated approach at international level, yearly updating its *Global Illicit Drug Trends* report, which provides, for each type of substance, statistical data and conceptual analyses on the extension and evolution of the market, and on the main trends of production, trafficking and consumption. Moreover, UNODC provides information about production, wholesale and retail prices, where local prices are determined taking into account a wide set of variables (interaction between demand and supply, purity of substances, the risk associated to the production and trafficking, the availability of the illicit drug).

The European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) is the European agency devoted to provide information about the phenomena and the problems connected with illicit drug market. In order to achieve its aims, EMCDDA coordinates the activity of different focal points localised in the European countries, which operates as interface between the European Union and member states, assuring the requested flow of information according to the established standards. EMCDDA has the role of developing and implementing a wide set of key indicators that should assure comparability between European countries in terms of incidence of consumption, harm reduction programs, consumption behaviours, extension and characteristics of the market, and drug-connected disease.

The Italian focal point is located at the Anti-Drug Policy Department (Dpa). The Dpa provides EMCDDA with the results of two relevant surveys finalised to individuate the main pattern of consumption of illicit drugs: the GPS-DPA survey, which is based on a sample of the population aged 18-65; the SPS-DPA survey, which integrates the

[7] Sallusti F., Organizzazioni criminali e relazioni di filiera nel mercato della droga: un'analisi economica. L'Industria, 2014. Sallusti, F, Estimating cocaine market in Italy: a National Accounts framework, in: Rossi C., Vopravil. J., Illicit drug market and its economic impact. Universitalia, 2012.

preceding with a sample of the population aged 15-17. Other sources of data are provided by the Central Directorate of Anti-Drug Policies (Dcsa), Fiscal Police, Border Police, Justice and Health Ministries, National Council of Research (Cnr).

Further than their administrative databases, these institutions carry out specific surveys. Since 1990, the Health Ministry provide the results of a survey on the activity of the Public Services of Drug Addiction (Sert). The Justice Ministry collects information about the legal prosecutions connected with drug-related crimes. The Domestic Affairs Ministry supplies data about the results of the activity of different police departments (Fiscal police and Border policy), particularly about seizures.

Information about the value of substances along the value chain and indicators of purity are currently published by the Domestic Affairs Ministry and international institution (such as EMCDDA and UNODC).

In Italy, as in other European countries, availability and quality of data represent a key issue. Administrative databases as well as data coming from the research activities of non-profit organizations or universities are often characterized by different concepts and standards. Generally, these sources are not reliable and does not meet the standards of national account procedures, further than being hardly comparable.

Information characterized by a theoretical comparability can be collected from EMCDDA and UNODC, even though, also in this case, the quality of data is not fully guaranteed.

2.4 The estimates of quantity consumed

Direct information on drug consumption are not available. The demand approach is based on a quantity per price model, in which the consumption expenditure is equal to the number of users (consumers) multiplied by the average consumed quantity and street price. The same approach is applied for each type of drugs.

The approach can be formalized as follows:

$$HFCj = Nj * Q_{HFC}\, j * P_{HFC}\, j$$

where *HFC* is the value of final consumption expenditure, *N* is the number of drug consumers, Q_{HFC} the consumed quantity and P_{HFC} the retail price. The final consumption HFC is the sum up of the consumption for the different type of drugs j.

Number of users N is obtained by using surveys data that estimate the prevalence of use, in terms of rates, by type of substance: heroin, cocaine, cannabis, amphetamines, ecstasy and LSD[8]. Prevalence rate is based on the General Population Survey (GPS) conducted on a representative sample of individuals (population aged 15-64) through a postal questionnaire on the use of various illegal substances.

The prevalence rates disseminated are based on monthly, annual and lifetime prevalence rate and provide a picture of drug use among general population. These rates express respectively how many people have taken drugs during the last month, or the last year or during their lifetime[9].

[8] Survey 2010: sample 18.898 resident population; response rate 32,7%; postal survey.

[9] Three types of prevalence rates: lifetime prevalence ("Have you ever used the drug X?"), last 12 months prevalence ("Have you taken the substance X in the last 12 months? ") and the last 30 days prevalence ("Have you taken the substance X in the last 30 days? ").

Since 2010 the prevalence rates are released by the Drug Policies Department in the Annual Report to Parliament on drug addiction. For previous years, prevalence rates are the results of other general population surveys conducted by the National Research Council.

The data analysis for the year 2010 has highlighted some problems about the quality of information collection by type of drug. In particular, the phenomenon representation was not reliable in comparison with that published by other European countries and compared to surveys conducted in the previous years. For this reason the data published in the Annual Report to Parliament were reviewed analysing some other information, both national and supranational.

The last year prevalence rate can be used as a sort of a lower bound of the number of consumers. In Table 1 can be observed the last prevalence rates applied to the reference population.

Table 1: Last year prevalence rate applied to population aged 15-64, year 2010

Drugs	Last Year Prevalence Rate (%)	Consumers
Heroin	0.2	95,361
Cocaine	0.9	353,631
Cannabis	5.3	2,117,812
Amphetamine	0.2	75,494
Ecstasy	0.2	63,574
LSD	0.2	83,441
Total		**2,693,952**

By applying prevalence rates to the population, the number of consumers could be easily estimated. However, they do not guarantee accurate estimates and need to be refined in order to obtain reliable information.

Trying to quantify the overall size of the phenomenon, a first step is to consider the number of problematic users (drug addicts) who are outpatient of public or private treatment centres, as they represent the known component of the population of drugs users. This step is necessary at least to determine the number of people who abuse heroin, because it has been assumed that all the heroin users are drug addicts (as heroin provokes a strong addiction, it is reasonable to assume that all heroin users are drug addicts).

First step is comparing the number of heroin users obtained by prevalence rates with data about users in treatment (in Ser.T.) for abuse of heroin as a primary substance of addiction: heroin addicts in treatment in 2010 were about 115 thousand, while potential consumers obtained with prevalence rates were 95,361 in the same year.

Indeed, prevalence rate tends to largely under estimate consumers with respect to users in treatment. Consequently, heroin consumers are estimated based on the information provided by EMCDDA (*Estimated trends in the prevalence of problem and injecting drug use, rate per 1.000 population aged 15–64*), which is built up using a

multiplicative factor obtained by a capture-recapture model.[10] Using this information, the number of heroin consumers results to be higher, with a multiplicative factor of 2.3 (218,933 consumers for EMCDDA with respect to 95,361 for prevalence rate, year 2010).

This factor is used to correct the estimates obtained by applying prevalence rate for each type of illicit drug. For cocaine, a further correction based on the relationships between the number of consumers of cocaine and the number of consumers of cannabis is used.[11]

Using this procedure (which corrects original prevalence rates), the number of consumers for each type of illicit drug can be obtained. This correct amount of consumers is divided into three different types of consumers (which help to define consumption habits): problematic users, regular users and occasional users.

These categories (in Table 2) are individuated according to the frequency of consumption (and the quantity of doses): occasional users tries illicit drugs but they are able to limit the frequency of use; regular users weekly consume illicit drugs, particularly during the week end; problematic users generally daily consume and abuse illicit drugs.[12] In terms of incidence of the different categories, information found in the literature is used.[13]

Table 2: Consumption patterns (percentage values)

Drugs	Intensive Users	Regular users	Occasional users
Heroin	100		
Cocaine	10	30	60
Cannabis	14	42	44
Amphetamine	10	13	77
Ecstasy	9	16	75
LSD	9	16	75

The estimates of the number of consumers by type of substance and frequency of consumption are shown in Table 3

[10] F. Mascioli, C. Rossi, (2008), Capture-recapture methods to estimate prevalence indicators for the evaluation of drug policies, *Bulletin on Narcotics*, vol. LX.

[11] The relationship between cocaine and cannabis consumers is found in the work of Rossi, C. (2013) *Monitoring the size and protagonist of drug market: combining supply and demand data sources and estimates*, Current Drug Abuse Reviews, 6.

[12] Fabi et al. "Segmentazione e valutazione del mercato dal lato domanda. In G.M. Rey, C. Rossi, A. Zuliani, (2011), "Il mercato delle droghe: dimensione, protagonisti, politiche".

[13] Further insights into aspects of the EU illicit drugs market, European Commission, 2013.

Table 3: Drug users – Year 2010

Drugs	Total consumers	Problematic	*Regular*	*Occasional*
Heroin	216295	*216295*	-	-
Cocaine	1022010	*102201*	*306603*	*613206*
Cannabis	4803543	*672496*	*2017488*	*2113559*
Amphetamine	171233	*17123*	*22260*	*131850*
Ecstasy	144196	*12978*	*23071*	*108147*
LSD	189258	*17033*	*30281*	*141943*
Total	**6546536**	***1038126***	***2399704***	***3108706***

Once the consumers are divided into the different typologies, using the assumptions about consumption behaviours in Table 4, the quantity consumed for each illicit drug can be estimated. The assumption about consumption behaviours, particularly the frequency of use and the average dose are defined based on the comparison with the hypotheses used in similar European studies[14] and taking into consideration insights by the analysts of Central Directorate of Anti-Drug Services (DCSA).

Table 4: Assumptions about consumption behaviours by category of users and illicit drug – Year 2010

Drugs	Intensive Users			Regular Users			Occasional Users		
	Dayu per Year	Unit per Day	Quantity per Unit (Gr, Pz)	Dayu per Year	Unit per Day	Quantity per Unit (Gr, Pz)	Dayu per Year	Unit per Day	Quantity per Unit (Gr, Pz)
Heroin	295	1	1						
Cocaine	300	1	1	150	1	1	36	1	1
Cannabis	300	3	0	150	2	0	36	1	0
Amphetamine	300	1	2	150	1	2	36	1	1
Ecstasy	300	1	2	150	1	2	36	1	1
LSD	300	1	2	150	1	2	36	1	1

Using retail price provided by the Italian Ministry of Public Affairs, the estimate of the final consumption of households relating to illicit drugs can be completed.

2.5 The estimates of economic aggregates

[14] Further insights into aspects of the EU illicit drugs market, European Commission, 2013.

The procedure described in the preceding paragraph permits to define, for each substance j, the quantity Q_{FC} devoted to domestic consumption. Once the relative consumption price P_{FC} is known, the amount of final consumption can be defined, for each j, as:

$$FC = Q_{FC} * P_{FC}$$

Table 5: Households final Consumption – Year 2010

Drugs	Consumers	Consumed Quantity	Consumption Price	Final Consumption
	Unity	Kg, Pz	Euro per Kg, Pz	Mln Euro
Heroin	216295	44695	41950	1875.0
Cocaine	1022010	83752	69160	5792.3
Cannabis	4803543	331365	9721	3221.3
Amphetamine	171233	21698678	17	367.8
Ecstasy	144196	18601339	17	309.2
LSD	189258	24414257	26	636.7
Total				**12202.3**

Exports (only for cocaine, heroin and cannabis derivatives) are estimated by applying to the exported quantity Q_{EX} the price P_{DW}, which represents the value of the given substance within the domestic territory (at wholesale level). This implies that importers who sell to non-resident units at a higher price with respect to P_{IW}, that is the price at which they bought the substances in the international market. The quantity of illicit drug exported is defined based on a share of the quantity devoted to final consumption. Thus, exports can be estimated, for each j, as:

$$EXP = Q_{EX} * P_{DW}$$

where $Q_{EX} = \alpha * Q_{FC}$ with $\alpha < 1$. Particularly, Table 6 reports the value of α for each illicit drugs as assumed based on information provided by The Italian Central Directorate of Anti-Drug Services (DCSA).

The imported quantity can be determined by summing up the two components (the quantity devoted to the domestic market and the quantity devoted to foreign markets). The first is defined taking into account the differential in purity, which subsists between the international wholesale and the retail market. The second, supposing that importers does not adulterate substances, is simply additive. Once P_{IW} is defined as the reference price in the international markets (determined as the average value of the given substance in the producer Countries market and the value in the arrival Country), imports, for each substance j, can be calculated as:

$$IMP = (\rho * Q_{FC} + Q_{EX}) * P_{IW}$$

where $\rho < 1$ is the purity factor (calculated as the ratio between the purity at the retail market and the purity at the international market, whose value is assumed based on information provided by DCSA) of the given illicit drug.

Table 6: Imports and Exports flows – Year 2010

Imports and Exports

Drugs	Purity at Retail Market	Purity at International Market	Imported Quantity for Internal Consumption	Export Share	Exported Quantity	Total Imported Quantity	International Market Price	Reference Price for Exporters	Imports	Exports	Exported Trade Margins
Typology	Share of Pure Substance	Share of Pure Substance	Kg, Pz	Share of Imported Quantity for Internal Consumption	Kg, Pz	Kg, Pz	Euro per Kg, Pz	Euro per Kg, Pz	Mln Euro	Mln Euro	Mln Euro
Heroin	0.08	0.4	8939	0.05	447	9386	11600	22000	108.9	9.8	4.6
Cocaine	0.15	0.9	13959	0.2	2792	16750	18658	35490	312.5	99.1	47.0
Cannabis	1	1	331365	0.05	16568	347933	1157	1938	402.7	32.1	12.9
Amphetamine	1	1	21698678	0	0	21698678	3	5	66.1	0.0	0.0
Ecstasy	1	1	18601339	0	0	18601339	3	5	55.4	0.0	0.0
LSD	1	1	24414257	0	0	24414257	3	5	75.9	0.0	0.0
Total									**1021.5**	**141.0**	**64.6**

Once the magnitude of the market has been determined, the aggregates related to the different activities along the supply chain can be estimated.

The international wholesale trade implies the import and the selling (to resident and to non-resident units) of illicit drugs. Adulteration is not carried out at this stage of the value chain. The quantity sold by importers is therefore the same they have bought in the international markets. Thus, trade margins are linked to the differential between the purchase price P_{IW} and the selling price P_{DW}.

In this context, they can be obtained, for each j¸ as:

$$TM_{IW} = F_{IW} - A_{IW}$$

where $F_{IW} = P_{DW} * (\rho * Q_{FC} + Q_{EX})$ is the value of the sold products and $A_{IW} = (\rho * Q_{FC} + Q_{EX}) * P_{INT}$ is the value of the product bought to be sold.

The estimates of intermediate costs can be carried out taking into account the set of goods and services that are needed to operate in that point of the value chain. Generally, they can be obtained as the sum of the value of the *i* legal goods and services consumed in the production process, that is:

$$IC_{IW} = \sum_{i=1}^{n} P_i * Q_i$$

However, the exact definition of quantities and prices actually used and paid is difficult and not reliable. Thus, the estimate is carried out by supposing, for each *j*, that the value of intermediate consumption connected with the use of a given *i* legal product or service can be obtained as a share α_i of the value of sold.[15]

15 For each illicit drug *j* and for each activity along the supply chain, the *i* legal goods and services used in the productive process and their incidence on the value of sold have been defined according with informal information collected from analysts and experts of the DCSA Particularly, in the case of

Finally, the value added is obtained as the difference between trade margins and intermediate costs:

$$VA_{IW} = TM_{IW} - IC_{IW}$$

Table 7 describes how to estimate the aggregates for the international wholesale trade. Table 8 shows the corresponding estimates.

Table 7: International wholesale trade

International wholesale trade			
	Quantity	*Price*	*Value*
Value of sold	$(\rho * Q_{FC} + Q_{EX})$	P_{DW}	F_{IW}
Value of products bought to be sold	$(\rho * Q_{FC} + Q_{EX})$	P_{INT}	A_{IW}
Intermediate costs			
- *Transport*	in percentage with respect to the value of sold		IC_{IW}
- *Logistics*	in percentage with respect to the value of sold		
Trade margin		$TM_{IW} = F_{IW} - A_{IW}$	
Value added		$VA_{IW} = TM_{IW} - IC_{IW}$	

Table 8 Aggregates for the international wholesale trade – Year 2010

International Wholesale Trade									
Drugs	Total Imported Quantity	Reference Price for National Wholesalers	Value of Sold	Value of Products Bought to be Sold	Trade Margin	*Transport*	*Logistics*	Totale Intermediate Costs	Value Added
Typology	Kg, Pz	Euro per Kg, Pz	Mln Euro	Mln Euro	Mln Euro	*Mln Euro*	*Mln Euro*	Mln Euro	Mln Euro
Heroin	9386	22000	206.5	108.9	97.6	*10.3*	*4.1*	14.5	83.2
Cocaine	16750	35490	594.5	312.5	281.9	*29.7*	*11.9*	41.6	240.3
Cannabis	347933	1938	674.3	402.7	271.6	*33.7*	*13.5*	47.2	224.4
Amphetamine	21698678	5	110.1	66.1	44.0	*5.5*	*2.2*	7.7	36.3
Ecstasy	18601339	5	92.3	55.4	36.9	*4.6*	*1.8*	6.5	30.5
LSD	24414257	5	126.5	75.9	50.6	*6.3*	*2.5*	8.9	41.7
Total			**1804.2**	**1021.5**	**782.7**	***90.2***	***36.1***	**126.3**	**656.4**

The domestic wholesale trade implies the purchase of illicit drugs from importers and the selling to retailers. At this stage, adulteration is carried out using chemicals products, which modify the level of purity of substances. Consequently, trade margins are generated by both a differential in prices (between P_{DW} – the purchase price – and P_{RT} – the selling price) and in quantity (between $\rho * Q_{FC}$ – the part of imported products devoted to the domestic market – and Q_{FC} – the quantity actually found in the retail market).

In this context, the trade margins can be obtained, for each *j*, as:

$$TM_{DW} = F_{DW} - A_{DW}$$

International wholesale trade, transport and logistics costs have been supposed to represent respectively, the 5% and the 2% of the value of sold (based on information provided by DCSA).

where $F_{DW} = P_{RT} * Q_{HFC}$ is the value of the sold products and $A_{DW} = (\rho * Q_{FC}) * P_{DW}$ is the value of the product bought to be sold.

Also in case, the estimate of intermediate costs is carried out based on their incidence on the value of sold,[16] and the value added can be calculated, for each *j*, as:

$$VA_{DW} = TM_{DW} - IC_{DW}$$

Table 9 describes how to estimate the aggregates for the domestic wholesale trade. Table 10 shows the corresponding estimates.

Table 9: Domestic wholesale trade

Domestic wholesale trade			
	Quantity	*Price*	*Value*
Value of sold	Q_{FC}	P_{RT}	F_{DW}
Value of products bought to be sold	$(\rho * Q_{FC})$	P_{DW}	A_{DW}
Intermediate costs			
- *Transport*	in percentage with respect to the value of sold		
- *Logistics*	in percentage with respect to the value of sold		IC_{DW}
- *Chemicals*	in percentage with respect to the value of sold		
Trade margin			$TM_{DW} = F_{DW} - A_{DW}$
Value added			$VA_{DW} = TM_{DW} - IC_{DW}$

Table 10 Aggregates for the domestic wholesale trade – Year 2010

National Wholesale Trade

Drugs	Purity at Retail Market	Purity at International Market	Purity Factor	Imported Quantity for Internal Consumption	Quantity Sold to Retailers	*Reference Price for Retailers*	*Value of Sold*	Value of Products Bought to be Sold	Trade Margin	*Transport*	*Logistics*	*Chemicals*	Totale Intermediate Costs	Value Added
Typology	Share of Pure Substance	Share of Pure Substance		Kg, Pz	Kg, Pz	*Euro per Kg, Pz*	*M ln Euro*	M ln Euro	M ln Euro	*M ln Euro*	*M ln Euro*	*M ln Euro*	M ln Euro	M ln Euro
Heroin	0.1	0.40	5.0	8939	44695	30000	1340.9	196.7	1144.2	*67.0*	*26.8*	*40.2*	134.1	1010.1
Cocaine	0.2	0.90	6.0	13959	83752	50700	4246.2	495.4	3750.8	*212.3*	*84.9*	*127.4*	424.6	3326.2
Cannabis	1.0	1.00	1.0	331365	331365	5383	1783.9	642.2	1141.7	*89.2*	*35.7*	*0.0*	124.9	1016.8
Amphetamine	1.0	1.00	1.0	21698678	21698678	10	220.2	110.1	110.1	*11.0*	*4.4*	*0.0*	15.4	94.7
Ecstasy	1.0	1.00	1.0	18601339	18601339	10	184.6	92.3	92.3	*9.2*	*3.7*	*0.0*	12.9	79.4
LSD	1.0	1.00	1.0	24414257	24414257	10	253.0	126.5	126.5	*12.7*	*5.1*	*0.0*	17.7	108.8
Total							**8028.9**	**1663.2**	**6365.7**	**401.4**	**160.6**	**167.6**	**729.6**	**5636.0**

The last activity along the supply chain is represented by retail trade. At this stage, adulteration is not carried out (or it can be considered irrelevant). Thus, trade margins are generated only by a differential in price, that is, for each *j*:

$$TM_{RT} = F_{RT} - A_{RT}$$

[16] In the case of National wholesale trade, the cost connected with transport, logistics and chemicals have been assumed to represent, respectively, the 5%, 2% and 3% of the value of sold (based on information provided by DCSA). Chemicals are included because adulteration is supposed to be carried out at this stage of the value chain.

where $F_{RT} = P_{FC} * Q_{FC}$ is the value of sold and $A_{RT} = Q_{FC} * P_{RT}$ is the value of the products bought to be sold.

Once IC_{RT} is estimated based on the incidence of intermediate costs[17] on the value of sold, the value added can be calculated, for each j, as:

$$VA_{RT} = TM_{RT} - IC_{RT}$$

Table 11 describes how to estimate the aggregates for the retail trade. Table 12 shows the corresponding estimates.

Table 11: Retail trade

Retail trade			
	Quantity	*Price*	*Value*
Value of sold	Q_{FC}	P_{FC}	F_{RT}
Value of products bought to be sold	Q_{FC}	P_{RT}	A_{RT}
Intermediate costs			
- Transport	in percentage with respect to the value of sold		IC_{RT}
- Logistics	in percentage with respect to the value of sold		
Trade margin			$TM_{RT} = F_{RT} - A_{RT}$
Value added			$VA_{RT} = TM_{RT} - IC_{RT}$

Table 12: Aggregates for the retail trade – Year 2010

Retail Trade										
Drugs	Consumed Quantity	Reference Price for Retailers	Consumption Price	Value of Sold	Value of Products Bought to be Sold	Trade Margin	*Transport*	*Logistics*	Totale Intermediate Costs	Value Added
Typology	Kg, Pz	Euro per Kg, Pz	Euro per Kg, Pz	M ln Euro	M ln Euro	M ln Euro	*M ln Euro*	*M ln Euro*	M ln Euro	M ln Euro
Heroin	44695	30000	41950	1875.0	1340.9	534.1	*18.7*	*37.5*	56.2	477.9
Cocaine	83752	50700	69160	5792.3	4246.2	1546.0	*57.9*	*115.8*	173.8	1372.3
Cannabis	331365	5383	9721	3221.3	1783.9	1437.4	*32.2*	*64.4*	96.6	1340.7
Amphetamine	21698678	10	17	367.8	220.2	147.6	*3.7*	*7.4*	11.0	136.5
Ecstasy	18601339	10	17	309.2	184.6	124.6	*3.1*	*6.2*	9.3	115.3
LSD	24414257	10	26	636.7	253.0	383.7	*6.4*	*12.7*	19.1	364.6
Total				**12202.3**	**8028.9**	**4173.4**	**122.0**	**244.0**	**366.1**	**3807.3**

2.6 Results

The estimation procedures described in the preceding sections lead to the estimates of aggregates shown in Table 13, referred to 2010. The activities connected with the trade of illicit drugs generate a value added of 10.0 billion euros. The value of household final consumption is 12.2 billion euros. Imports and exports are estimated to

[17] In the case of Retail trade the incidence of transport and logistics costs are assumed to be, respectively, the 1% and 2% of the value of sold (based on information provided by DCSA).

be, respectively, 1021 and 141 million euros. The total turnover connected with the trading of illicit drug is 22.0 billion euros, generating a trade margin of 11.3 billion of euros (7.1 billion euros at the wholesale level and 4.2 at the retail level). Intermediate costs connected with legal goods and services are estimated to be 1.2 billion euros, and their composition by industry is shown in Table 14.

Table 13: Main economic aggregates related to illicit drugs – Year 2010 (million Euros)

Final Results

Drugs	Households Final Consumption	Imports	Exports	Value of Sold	Value of Product to be sold	*Trade Margins (Wholesale)*	*Trade Margins (Retail)*	Total Trade Margins	Total Intermediate Costs	Value Added
Typology	M ln Euro	M ln Euro	M ln Euro	M ln Euro	M ln Euro	*M ln Euro*	*M ln Euro*	M ln Euro	M ln Euro	M ln Euro
Heroin	1875.0	108.9	9.8	3422.3	1646.4	*1241.8*	*534.1*	1775.9	204.8	1571.1
Cocaine	5792.3	312.5	99.1	10633.0	5054.1	*4032.8*	*1546.0*	5578.8	640.0	4938.8
Cannabis	3221.3	402.7	32.1	5679.5	2828.8	*1413.3*	*1437.4*	2850.7	268.7	2582.0
Amphetamine	367.8	66.1	0.0	698.1	396.4	*154.2*	*147.6*	301.7	34.2	267.6
Ecstasy	309.2	55.4	0.0	586.2	332.3	*129.2*	*124.6*	253.9	28.7	225.2
LSD	636.7	75.9	0.0	1016.3	455.4	*177.1*	*383.7*	560.8	45.7	515.1
Total	**12202.3**	**1021.5**	**141.0**	**22035.3**	**10713.5**	**7148.4**	**4173.4**	**11321.8**	**1222.0**	**10099.8**

Table 14: Intermediate consumption – Year 2010

Intermediate Costs

Drugs	*Shipping Transport Costs*	*Ground Transport Costs*	Total Transport Costs	Logistics	Chemicals	Total Intermediate Costs
Typology	*M ln Euro*	*M ln Euro*	M ln Euro	M ln Euro	M ln Euro	M ln Euro
Heroin	*96.1*	*10.3*	85.8	68.4	40.2	204.8
Cocaine	*300.0*	*29.7*	270.2	212.7	127.4	640.0
Cannabis	*155.1*	*33.7*	121.4	113.6	0.0	268.7
Amphetamine	*20.2*	*5.5*	14.7	14.0	0.0	34.2
Ecstasy	*16.9*	*4.6*	12.3	11.7	0.0	28.7
LSD	*25.3*	*6.3*	19.0	20.3	0.0	45.7
Total	***613.7***	***90.2***	***523.5***	***440.7***	***167.6***	***1222.0***

3. Estimate of prostitution services

A general framework on the prostitution market and the related legislation is discussed in this section. A synoptic scheme of the estimation procedure explaining the conceptual model used and the assumptions is also described. The information source, the estimation procedure of economic aggregates and the related activities linked to prostitution are analysed.

3.1 Reference framework

Prostitution is legal in Italy while organizing prostitution and pimping are illegal. Italy has an approach of neo-abolitionist about prostitution: outdoor prostitution is neither prohibited nor regulated, while the indoor one is not allowed only in the

brothels. This means that is not a crime to offer sex for payment (except for soliciting) or purchase paid sexual services but pimping, recruitment and aiding and abetting are punished as a criminal activities related to the prostitution.

The large increase of illegal immigration since 1990 has contributed to the prostitution and pimping growth, often associated with organized crime.

There is a real difficulty to understand how the illegal immigration has contributed to the prostitution growth as well as the role of the pimps. Therefore the assumption is that prostitution value includes all these elements.

3.2 An overview of the estimation procedure

Eurostat suggests a supply- side approach. Demand side estimation is not appropriate in order to carry out a reliable picture of the prostitution phenomenon for the national account purposes.

The more suitable approach is the one taking into account different types of prostitution (street, apartment, night club). In this way is possible to obtain a less unbiased estimation for every type of prostitution services and for the related variables: prostitutes' number, average costs, and daily average performances per year.

According to some specific researches and studies, it is possible to assume that in Italy there is a relevant domestic production of prostitution service provided entirely for resident population. The share of import and export service is considered not significant.

Prostitutes' intermediate consumption is estimated as well. The assumption is that a share of intermediate consumption is already included in the estimates of household final consumption and therefore it is required to carry out a new assignment of some good and services costs from households consumption to intermediate consumption.

The estimation procedure adopted is based on the number of prostitutes splitted into three types of services such as street, apartment, night clubs prostitutes. Applying to these types of prostitutes the correspondent number of daily performances and the number of working days per year it is possible to determine the overall number of performances. Service value is obtained by using the average costs depending on the type of services.

Figure 2 shows the synoptic scheme of the adopted estimation procedure.

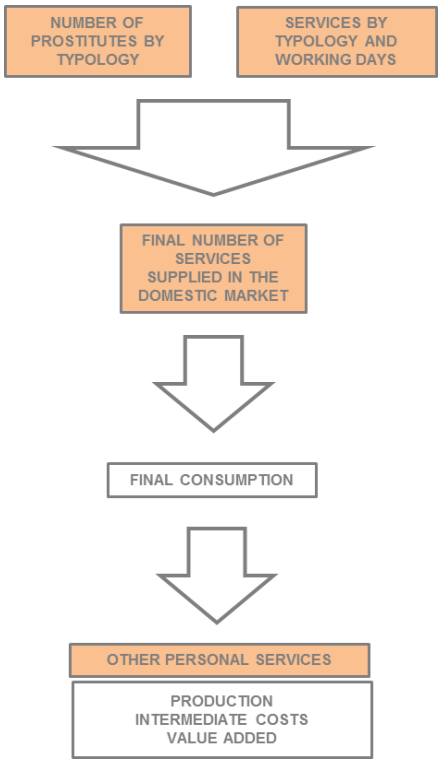

Figure 2: Synoptic scheme of the estimation procedure (Prostitution)

3.3 Data sources

Information and data source about prostitution are lacking. The few available data are collected from non-profit organizations or prostitutes associations that allow quantifying local phenomenon rather than national. There are also specific studies of university researchers and journalists and legal data on pimping and all crimes related.

The estimates about prostitution present a considerable level of uncertainty as this phenomenon is quite difficult to measure.

The starting point for the estimates is represented by the number of prostitutes (by type) and by the assumption about the number of daily services. This information provides the ground to estimate the final number of services supplied in the domestic market. For prostitution import and export are set equal to zero by hypothesis. Final consumption can be estimated by attributing a price to each typology of service. The difference between revenues and intermediate costs permits to estimate the value added.

In order to estimate the value of prostitution service in Italy, data and information from specific studies (European Commission, Gruppo Abele[18] e Codacons) is mainly used.

According to a research carried out by the Abele group the number of prostitutes in Italy in 2010 was 30,000. The same source in a study conducted in cooperation with the

[18] Gruppo Abele is a non-profit organization founded in Turin in 1965 by Don Luigi Ciotti. The Group carries out 60 different social activities, including drug rehabilitation centre, listening centre and counselling, projects for trafficking victims and migrants.

Parsec Consortium[19] showed that 65% of the prostitutes work in the street, the remaining 35% indoor[20].

According to a recent research carried out in some member countries and promoted by the European Commission ("Outreach in indoor sex work settings" of 2011[21]), the indoor prostitution is concentrated mainly in the apartments, night clubs, hotels and saunas.

Few information concerning daily and weekly performance of sex workers are available. According to surveys conducted by a private association, the average number of daily performances is equal to 10 (for the reference year 2012).

Information about sex performance prices was gathered by a private association (Codacons, Coordination of Associations for the Defence of the Environment and the Rights of Users and Consumers); that association has conducted a sample survey on the three cities Milan, Rome and Naples.

The difference between revenues and intermediate costs permits to estimate the value added.

3.4 The estimates of economic aggregates and results

First step to define the amount of the prostitution service is determining the sex workers number. Prostitutes are divided into different typologies since the sexual performance can happen in different places. The prostitutes' number, the average costs and the number of performances can vary depending on the type/place of prostitution.

For the estimation the following typologies are considered:

- in clubs (it can be practiced by sex workers who work as a freelancer paying the use of the club place)
- in apartments (it can be practiced in own home or in a rented room)
- on the street (the cheapest type of prostitution)

The reference estimation approach is as follows:

$$P = N * Q_{HFC} * P_{HFC}$$

where *P* is the value of the prostitution services, *N* is the prostitutes' number, Q_{HFC} is the number of performances and P_{HFC} is the average cost. The value of production is calculated for each types of prostitution considered.

The total value of the service (*P*) is the resultant of the production for the different types of prostitution. The production value is equal to the value of final consumption expenditure for prostitution.

The prostitutes' number by types is shown in Table 15.

[19] It is a consortium of social cooperatives and no profit associations born in March 2002; currently four structures adhere to this consortium with the aim to plane and implement social interventions.

[20] Research funded by the City of Rome in 2005 and carried out by Parsec.

[21] Survey carried out in Italy by the Committee for Civil Rights of Prostitutes in order to know the structure and organisation of indoor prostitution in some main Italian cities.

Table 15 –Number of prostitutes by type – Year 2010

Number of prostitutes by type		
	2010	Source
Total number of prostitutes	30,000	Guppo Abele
- street	19,500	65% (Guppo Abele)
- apartment	9,870	35% in indoor (gruppo Abele): of which 33% in apartment and 2% in club ("Outreach in indoor sex work settings")
- club	630	

Information about prices of single performances are gathered by a private association (CODACONS) and in the estimation of the aggregates the average price was estimated and used for final estimation (Table 16).

Table 16 – Prices by types of performance – Year 2010

Prices by types of performance		
	euro	Source
Minimum price (hp I)	30	Codacons reserach, 2010
- street	50	Codacons reserach, 2010
- apartment	150	Abele group, 2006
- club		
Maximum price (hp II)		
- street	50	Codacons reserach, 2010
- apartment	150	Codacons reserach, 2010
- club	400	Gruppo Abele, 2006
Average price (hp III)		
- street	40	Codacons reserach, 2010
- apartment	100	Codacons reserach, 2010
- club	275	Gruppo Abele, 2006

Some assumptions about the number of performances have been made (Table 17).

Table 17 – Number of performances by type – Year 2010

Number of performances by type		
	Hp	Source
Number of performances per prostitute		
- street	10	Gruppo Abele, 2014 (10 daily average performances)
- apartment	5	
- club	5	
Working days		
- street	300	Gruppo Abele, 2014 (days per year)
- apartment	260	
- club	260	

Daily average performances and working days during the year are assumed to be stable over time.

The estimated value of prostitution service for the year 2010 is shown in Table 18.

Table 18 – Value of prostitution service, year 2010 (million Euros)

Value of prostitution service	
Hp (average prices)	2010
- street	2340
- apartment	1283
- club	225
Total	**3848**
% GDP	0.2%

In order to avoid a double counting in final consumption expenditures, estimates on intermediate consumption are carried out with regard to goods and services involved in prostitution services. The value of intermediate consumption related to the prostitution service can be obtained as a share of the value of production for each type of performance (street, apartment and club). Goods and services involved in intermediate costs estimation are: wearing apparel, rubber products for final use (meanly condoms), hotel and similar accommodation services and entrainment services.[22] Total intermediate consumption value in prostitution services is around 395 million Euros in the year 2010.

All the prostitutes are considered as self-employed whose remuneration can be considered equal mixed income. The prostitution service, as suggested by Eurostat, is considered to be aimed at households only; as a result of this hypothesis the intermediate costs by companies are not relevant.

As with drugs, part of income of the prostitutes moved abroad as property income paid to the rest of the world has not been estimated.

It is reasonable to estimate the prostitution service for a reference year and to extrapolate the results for the next years as it believes that consumer behaviour is fairly stable over time.

4. Estimate of smuggling aggregates

In this section a general framework for the estimation of tobacco smuggling is provided. In this context a synoptic scheme of the procedure and the assumptions used to estimate relevant aggregates are presented and data sources and results of the estimates are illustrated.

4.1 General framework

[22] The value of intermediate costs are defined as a share of the value of production according with informal information collected from non-profit organizations, prostitutes associations and specific studies. Intermediate costs in wearing apparel has been supposed to represent respectively 1% for street and clubs' prostitution and the 2% for apartment; in rubber products 0.5% for all types of prostitution; in hotel and similar accommodation services, considered only for apartment prostitution, is supposed to be 15%; creative arts and entrainment services, considered only for club prostitution, is supposed to be 60% (prostitutes leave at owner of the night club more than the half of their earning).

Smuggling activities identifies the violation of tax provisions relating to the manufacture, trade and consumption of products subject to the payment of a manufacturing or consumption tax. Cigarette smuggling is therefore convenient when there is a high variability in prices between countries due to taxes on the product. Smuggling activity goes often along with the counterfeit of cigarettes: this is the production of not original tobacco products using a trademark without the authorization of the owner.

Up to the end of the nineties, the penetration of illegal cigarettes in Italy was very strong. Since then, the combined effect of firm action carried out by the Police[23], plus a series of innovations in the control of production and distribution chain, have greatly reduced the size of this phenomenon.

The geographical position of our country, however, is peculiar with respect to the illegal trafficking of cigarettes and makes Italy a territory of both transit and final distribution of illegal products. In particular, recent data provided by the Customs Agency show that Italy is acquiring, again as in the past, the connotation of final destination country of smuggled cigarettes[24]. This phenomenon concerns, in large part, smuggled cigarettes produced in Eastern European countries reaching by roads mostly large cities such as Rome, Turin, Milan and Naples[25]. According to the Police, the phenomenon seems to be mainly driven by the spread of so-called cheap-white, cigarettes manufactured and sold legally in countries outside the European Union.

4.2 The estimation approach

To estimate smuggling activities, Eurostat suggests, as well as for other illegal activities, the use of demand indicators[26] based on smokers' population and its consumption habits. This approach has been tested in Italy, however, the results have proven to be not usable since the survey that detects this information seems to underestimate[27] the incidence of the smokers' population and returns data that are structurally underestimated compared to those provided by other sources on official sales[28]. It was decided, therefore, to use a supply-side approach based on administrative data on seizures from police and customs (Guardia di Finanza and Custom Agency).

After the privatization of the Ente italiano Tabacchi (Italian Tabacco Agency), which took place at the beginning of the new millennium, the production of cigarettes in Italy has steadily fallen while climbing the share of imported products. The legal supply chain of tobacco, however, does not seem to be contaminated and, currently, there is no evidence of collusion between the production companies and organizations involved in smuggling.

The analysis of specific reports and direct information collected from police allowed, therefore, to assume that in Italy there is a significant import of illegal cigarettes and

[23] The most known action is the operation "Primavera" that took place in 2000.

[24] Source: Hearing of representatives of the Guardia di Finanza (Italian law enforcement Agency), the verbatim report of the meeting of 16 May 2012; documents submitted to the Commission by representatives of British American Tobacco at the hearing held on February 1, 2012 and acquired the acts - Doc. 97/2.

[25] Source: Hearing of the Director of Customs Agency, Dr. Giuseppe Peleggi, verbatim report of the meeting of May 9, 2012. (http://documenti.camera.it/_dati/leg16/lavori/stenbic/64/2012/0509/s000r.htm)

[26] Eurostat/C3/GNIC/230 (2012)

[27] Istat, Yearly survey "Aspects of daily life". The results of the exercise done can be provided.

[28] Data published by " Custom and Monopoly Agency"

equally significant amount of goods in transit to other destination countries, while domestic production and export can be assumed as negligible.

The adopted methodology can be schematically described as follows: it starts from the estimates of the quantities seized within the geographical territory of the country that is then reported to the potential production for sale through the seized rate, this total includes also the amount of goods in transit. The same goods, net of the part in transit, determine the amount of cigarettes destined to domestic final consumption. The corresponding amount in value is obtained by applying the retail price to data on seized goods.

The estimation scheme is shown in the following picture:

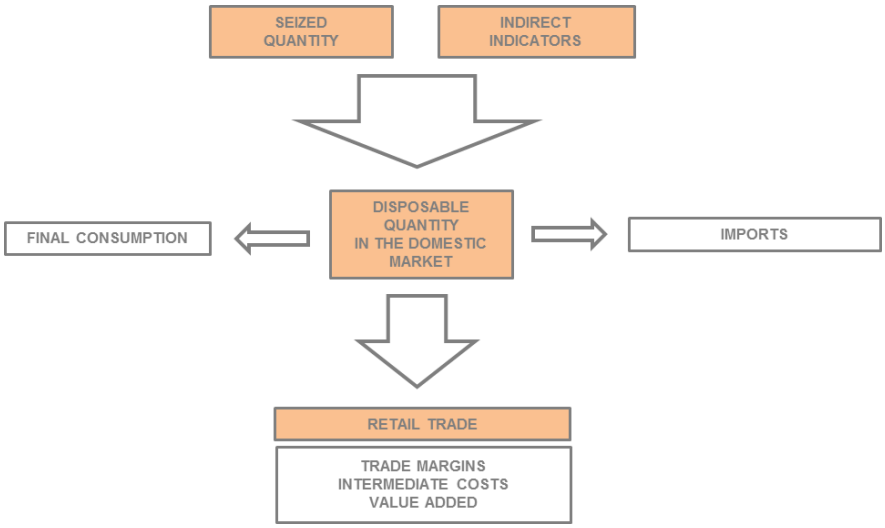

Figure 3: Synoptic scheme of the estimation procedure (Smuggling)

4.3 Data sources

The sources of information, that allow reaching an indirect estimation of the amount of cigarettes illegally consumed, are represented by the data on seizures made by Guardia di Finanza and Customs Agency. Data are available yearly and, in some cases, also detailed by brand.

Since 2010, the information provided concern different types of cigarettes contributing to illicit trade in Italy[29]:

- The *original*: manufactured by multinational brand owners but imported beyond the established quantitative limit or through an illegal distribution chain;
- The *cheap white*: cigarettes manufactured and sold legally in countries outside the European Union, but for which there is no enough domestic demand in those countries to justify production levels. These cigarettes are illegal in the European Union.

[29] Source: Report on counterfeiting in the tobacco sector . Report of the parliamentary inquiry committee on the phenomena of counterfeiting and piracy in the commercial field (DOC. XXII-bis N.6) approved by the Committee at its meeting on September 12, 2012

- The *counterfeit*: cigarettes that bear a trademark used without the owner's permission and that, very often, are produced in countries with low labor costs and the presence of large economies of scale in tobacco production.

Guardia di Finanza also provides information on the amount of the so-called commodity consumed in fraud; the latter is an estimate made by the police of the quantity of cigarettes illegally entered in the national territory in cases where it has not been possible to ascertain the seize in the act (in the above case the police registers the illegal activity but it doesn't find the smuggled cigarettes because already consumed).

4.4 Estimate of the economic aggregates

Economic aggregates are estimated using a supply-side approach. It involves the availability of information on the amount of goods seized, on import and retail prices of goods smuggled as well as the necessity to make some assumptions (specifically, on the seizure rate[30] and on the share of illicit import of cigarettes that will be used in the domestic market).

The basic model to estimate sales of smuggled cigarettes is the following:

$$P = Q_{IMP} \, x \, P_{FC}$$

where P represents sales, Q_{IMP} the quantity of imported goods and P_{FC} its retail price. This equation was calculated for each different type of products (original cigarettes, counterfeit and cheap-white). Sales correspond to what is purchased by households (*HFC*).

Imports for the domestic market are estimated starting from the seizures information as follows:

$$Q_{impj} = (S1 \times \left(\frac{1}{sr} - 1 \right) + S2) \times a$$

where Q_{impj} is the imported quantity for the product *j*, *S1* is the quantity of goods seized, *S2* is the quantity consumed in fraud, *sr* is the seizure rate and ,within brackets, the coefficient for grossing up, *a* is the share of goods for the domestic market.

Illegal cigarettes can be deployed in both large and small quantities; besides smuggling of cigarettes, even if over time has been declining, is an illegal activity carried out in parallel with other activities currently more profitable (for example, counterfeiting of other goods, drug trade, prostitution and other). Due to the above characteristics, the seizure rate has been assumed equal to 5%.

A further assumption relates to the share of goods in transit to other final destinations. This is assumed to be 40% for original and counterfeit cigarettes and 50% of total cheap-white.

Total amount of import (IMP) is determined as follows:

$$IMP = Q_{IMP} \, x \, P_{DW} \, (fob)$$

[30] It represents a measure of quality and quantity actions against the phenomenon by police forces.

where Q_{IMP} is the total quantity imported and P_{DW} the import price. The value of the goods in transit is excluded from the value of imports.

Import prices should be the prices at which the goods are bought legally in the country of origin or the prices of the country of origin of the product. Due to the lack of direct information by type of product, import prices have been estimated for the benchmark year 2011. In particular, the import price of original was derived as an average of retail price of cigarettes seized. The average price was initially calculated considering official 2011 prices of the main brands of cigarettes seized (provided by the Customs Agency). Then, all taxation components were removed[31] (excise, VAT and the reseller premium). The result obtained has been assimilated to a wholesale price.

Import prices of counterfeit and cheap-white cigarettes were estimated based on assumptions derived from the information on studies and specialized press[32].

The retail price of original smuggled cigarettes was assumed to be 20% lower than the legal price, in order to take into account the convenient price for the consumers and a gain for the smuggler. Retail prices of counterfeit and cheap-white products were estimated based on assumptions derived from information on the prices of legal brands in the major producing countries.

Prices estimation for the benchmark year has been back-casted with suitable indicators (change rates of unit value indexes).

It has been assumed that illegal cigarettes are sold directly to households and therefore it is excluded that part of the smuggled goods enters the legal distribution chain.

Once estimated sales value (P), it has been possible to estimate the value of production as the value of trade margins (TM) minus the value of imports (IMP).

The value added (VA) was then obtained by subtracting intermediate consumptions (IC) from the value of production. IC are represented by the cost of transport and storage sustained by the smugglers, calculated as a share of total production per industry[33]. In particular, for transport costs it was assumed the same percentage used for drug trafficking; while for the cost of storage it has been used, as suggested by Eurostat, the same share of the traders of legal tobacco products.

The smugglers of illegal cigarettes were treated as self-employed workers who receive mixed profits similar to a gross operating income (GOS), and were considered all residents of the country; this latter assumption allows having no impact of the phenomenon on the national income.

[31] The composition of the price of cigarettes is also published by the Customs Agency.

[32] Source: Report on counterfeiting in the tobacco sector . Report of the parliamentary inquiry committee of on the phenomena of counterfeiting and piracy in the commercial field (DOC. XXII-bis N.6) approved by the Committee at its meeting on September 12, 2012 and "The factbook on the illecit trade in tobacco products" by Transcrime.

[33] For intermediate consumption the following product and industries are considered: Service of road freight transport recorded as a transport margin, in the industry "Freight transport by road and removal services"; Service of sea freight transport recorded as a transport margin, in the industry "Water transport"; storage and warehouse services, in the industry "Warehousing and storage services".

4.5 Results

The results of the calculation for year 2010 have been summarized in Table 19 below.

Table 19: Calculation of smuggling of cigarettes from the supply approach – Year 2010

		Type of product				Unit of measure	Source of information
		Genuine	*Counterfeit*	*Cheap - white*	Total		
a	Seized Quantity	111,466	62,361	106,261	280,088	kg.	Guardia di Finanza (Italian law enforcement Agency)
b	Import Price (Pdw)	0	0	0		euro per kg	Elaboration on Custom Agency data, information on studies and specialized press
c	Seizure rate (sr)	0.05	0.05	0.05		share	assumption
d	Imported quantity expansion factor	19	19	19		(1/sr)-1	calculation
e	Estimated imported quantity (a*d)	2,117,854	1,184,859	2,018,959	5,321,672	kg	calculation
f	*Consumed in froud*	20,168	-	-	20,168	kg	Guardia di Finanza (Italian law enforcement Agency)
g	Total imported goods (e + f)	2,138,022	1,184,859	2,018,959	5,341,840	kg	calculation
h	Transit rate	40%	40%	50%		share	assumption
i	Amount of goods in transit (h * g)	855,209	473,944	1,009,480	2,338,632	kg	calculation
l	Goods consumed in the country (g - i)	1,282,813	710,915	1,009,480	3,003,208	kg	calculation
m	**Imports (l*b)**	**41.3**	**17.8**	**32.5**	91.6	euro	calculation
n	Retail price	178	125	150		euro per kg	Elaboration on Custom Agency data, information on studies and specialized press
o	**Consumption (l * n)**	**228.3**	**88.9**	**151.4**	**468.6**	million euros	calculation
p	**Intermediate Costs**	-	-	-	**56.8**	million euros	assumption
	road freight transport				**11.9**	million euros	calculation
	see freight transport				**23.9**	million euros	calculation
	Storage and warehouse				**21.0**	million euros	calculation
q	**Trade Margins (o - m)**	**187.0**	**71.1**	**118.9**	**377.0**	million euros	calculation
r	**Value added (q - p)**				**320.2**	million euros	calculation

5. Results

Economic values of illegal activities for the main aggregates that contributed to estimate GDP for the reference year 2010 are shown in Table 20.

Table 20: Main aggregates by typology of illegal activity –Year 2010 (million Euros)

Activity	Final consumption	Imports	Production	Value added
Illicit drugs	12,202	1,021	11,322	10,100
Prostitution	3,848	-	3,848	3,455
Smuggling	377	92	377	320
Total illegal	16,428	1,113	15,547	13,874
Induced activity (*)				1,111
Incidence (%) (Total illegal/Total economy)				0.9

The aggregates for the time series 2002-2011 have been generally obtained by a separate estimate for each year, due to the unavailability of a preceding time series on which a traditional backcasting of aggregates could be made.

The characteristics of the relevant information (not always available with a yearly frequency) called for peculiar data processing (interpolation, use of indirect indicators, dynamic assumptions) in order to obtain the whole set of information per year. Value added by type of illegal activity for the time series 2002-2011 is shown in Table 21.

Table 21: Time series of value added by type of illegal activity, induced activity and total – Years 2002-2011 (million Euros)

Illegal activity	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Illicit drugs	**10174**	**10117**	**10121**	**11045**	**11200**	**12524**	**11511**	**10764**	**10100**	**10540**
Prostitution	**2681**	**2798**	**2903**	**2980**	**3085**	**3158**	**3256**	**3371**	**3455**	**3550**
Smuggling	**370**	**237**	**282**	**326**	**300**	**344**	**362**	**413**	**320**	**242**
Total (Illegal)	**13225**	**13152**	**13306**	**14351**	**14585**	**16026**	**15129**	**14548**	**13875**	**14332**
Induced activities	1042	1032	1033	1085	1085	1259	1241	1192	1111	1154
Total (illegal and induced)	**14267**	**14184**	**14339**	**15436**	**15670**	**17285**	**16370**	**15740**	**14986**	**15486**

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