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Working Paper

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WIDER Working Paper, No. 2021/191

Provided in Cooperation with:

United Nations University (UNU), World Institute for Development Economics Research (WIDER)

Suggested Citation: Moreau-Kastler, Ninon; Toubal, Farid (2021) : Legal opacity, narcotics laws, and drug seizures, WIDER Working Paper, No. 2021/191, ISBN 978-92-9267-131-0, The United Nations University World Institute for Development Economics Research (UNU-WIDER), Helsinki, <https://doi.org/10.35188/UNU-WIDER/2021/131-0>

This Version is available at:

<https://hdl.handle.net/10419/249497>

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WIDER Working Paper 2021/191

Legal opacity, narcotics laws, and drug seizures

Ninon Moreau-Kastler¹ and Farid Toubal²

December 2021

Abstract: We show that legal opacity is a strong factor in drug trafficking. We develop a new framework that illustrates how legal opacity influences countries' seizure rates. Legal opacity reduces the detection of illicit flows and increases their volumes because it lowers trafficking costs. We use detailed information from financial systems evaluations, international standards cooperation mechanisms, and economic indicators to construct a new worldwide legal opacity index that covers each of the last two decades. Our empirical results reveal the importance of legal opacity and the enforcement of narcotics laws for drug seizure rates.

Key words: opacity, drug trafficking, illicit flows, seizures, narcotics laws, narcotics

JEL classification: K42, O17, F50

Acknowledgements: We are grateful to UNU-WIDER for its scientific interest and support, and to all the UNU-WIDER Illicit Financial Flows 2021 Workshop participants. We thank UNU-WIDER and Gary Smith for their editing contribution.

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This study has been prepared within the UNU-WIDER project [Detecting and countering illicit financial flows](#) that is implemented in collaboration with the University of Copenhagen. The project is part of the [Domestic Revenue Mobilization](#) programme, which is financed through specific contributions by the Norwegian Agency for Development Cooperation (Norad).

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ISSN 1798-7237 ISBN 978-92-9267-131-0

<https://doi.org/10.35188/UNU-WIDER/2021/131-0>

Typescript prepared by Gary Smith.

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The Institute is funded through income from an endowment fund with additional contributions to its work programme from Finland, Sweden, and the United Kingdom as well as earmarked contributions for specific projects from a variety of donors.

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The views expressed in this paper are those of the author(s), and do not necessarily reflect the views of the Institute or the United Nations University, nor the programme/project donors.

1 Introduction

The volume of illicit trade in illegal narcotics has expanded rapidly over the last three decades.¹ Although the estimates differ across studies, recent works have contributed to creating a consensus that the illicit trade in illegal narcotics is sizeable (Clarke 2016), and is linked to substantial economic and social costs (OECD 2018; Shelley 2018). While globalization and the internet have been beneficial to traffickers, weak institutions and purposely lenient regulatory frameworks are fundamental to explaining illicit trade flows. Knowing the details of the environmental factors that allow corporate and private individuals to hide illicit activities is an essential policy tool for fighting illicit flows. This is, however, challenging as it requires detailed information on law and regulations across a large set of countries.

In this paper we provide such a tool and develop a new index of *legal opacity*. According to Murphy (2008: 6), some jurisdictions offer legal advantages in the form of: ‘a deliberate, legally backed, veil of secrecy that ensures that those from outside the jurisdiction making use of its regulation cannot be identified to be doing so’, and Cobham et al. (2015: 7) emphasize that ‘A major role of secrecy therefore is to facilitate changes in the form, but not the substance, of economic activity.’ Legal opacity acts as a transformation technology that allows products or flows that are illicit, due to their nature or origin, to take part in lawful global value chains, thereby transforming their illicit nature. This legal technology attracts flows that aim to avoid laws and moral obligations linked to economic activity and lowers the detection and seizure of these flows. The concept is linked to the concept of *legal haven* borrowed from the international law literature (Delmas-Marty 2004). In an extensive review of economic crime cases, Ducouloux-Favard (2010) demonstrates that legal tools and purposely lenient regulatory frameworks available in some territories allow corrupt politicians, regulation dodgers, and criminal organizations to implement illicit economic schemes. Such jurisdictions attract individuals and firms seeking to relocate part of their activity to benefit from local laws and regulations. Lemaître (2019) defines these jurisdictions as legal havens because ‘[a legal haven] adopts laws offering advantages to entities or private individuals allowing them to hide illicit activity and to exempt themselves from legal obligations linked to their economic activities’.

We combine detailed information on country rules and legal tools and techniques offered to hide illicit proceeds for 185 countries over the decade 2000–10 and 191 countries over 2010–20. Our legal opacity index considers various factors that influence the degree of legal opacity: the level of financial and banking secrecy; the availability of secretive vehicles; internal legal policies and regulations; and international cooperation. Financial or banking secrecy allows financial proceeds from illicit economic activities to be managed safely and reintegrated into the global financial system (Masciandaro and Balakina 2014). Secretive legal entities disconnect real actors from economic transactions (Palan et al. 2010; van der Does de Willebois et al. 2011). Internal laws and regulatory frameworks regarding economic crime can lower the probability of detection and alter the nature of transiting flows (Lemaître 2019). Finally, low international judiciary cooperation shields individuals from international pursuit (Lemaître (2019); Palan et al. (2010)). Our index is continuous, and the countries ranking highest are the most opaque. We identify legal haven countries as those at the top of the distribution.

We analyse whether the degree of legal opacity and the legal haven status influence drug trafficking. There is much anecdotal evidence and many media reports showing how traffickers implement sophisticated techniques and make use of legal tools and regulatory loopholes to shield their illicit assets. In late 2018, for instance, Greek authorities seized a freighter carrying over US\$100 million worth of

¹ According to the World Health Organization’s Resolution 56.1, illicit trade is defined as ‘any practice or conduct prohibited by law and which relates to production, shipment, receipt, possession, distribution, sale or purchase including any practice or conduct intended to facilitate such activity’.

cannabis and the amphetamine Captagon. The criminal network involved was connected to registered shell companies in the UK (Ashour et al. 2021), and these legal structures and loopholes contribute to legal opacity. Despite much anecdotal evidence and many archival documents, the effects of legal opacity on drug trafficking remain poorly understood.

We use data on drug seizures from the United Nations Office on Drugs and Crime. We collect data on drug seizures for 163 countries and territories over the period 2002–18. Our data set provides information on the volume of seizures in *kilogram equivalent* for 67 drug types (see United Nations Office on Drugs and Crime 2018). We identify the countries where the volume of seizures per drug type are the greatest. The analysis reveals important patterns of concentration of drugs in some countries within narrow subregions, as defined by the UN classification. Most of these countries have high levels of opacity. Drug seizures data are from the fraction of illicit drug flows that are detected by security forces and enforcement agencies. As such, the identification of the impact of legal opacity on drugs trafficking may create confusion because larger amounts of drugs being seized may reflect two opposite trends: legal opacity decreases the probability of detecting illicit flows but also increases their volumes. A number of important factors, such as changes in narcotic law enforcement priorities and regulations, may influence the quantity of a drug seized.² These factors need to be controlled for in an empirical analysis of drugs trafficking.

To guide our empirical analysis, we propose an illustrative framework of drug trafficking that helps to better understand how legal opacity influences drug seizures. Our framework builds on the ideas that the detection probabilities of illicit drug flows depend negatively on the levels of legal opacity, while illicit flows are affected positively by these levels. We model illicit flows in a gravity framework to reflect the geographical distribution of drugs and their concentration in nearby markets. Illicit traders pay smuggling costs to reach consumer markets. These costs are lower in more opaque countries.

Our empirical analysis uses the seizure rates defined as the volumes of seizures per capita. We explain the seizure rates by the level of opacity, the enforcement of anti-narcotics laws, and other important factors that affect drugs trafficking, such as the country’s capacity to fight criminal activities, the level of corruption, the onset of conflict, or geography. Since drug trafficking is more prevalent in production countries, we add an indicator that flags countries that produce opium, cocaine, or cannabis. All else being equal, our results suggest that drug trafficking is much more important in more opaque countries and in legal havens.

Our findings complement results in the literature on drug trafficking effects. Adverse consequences of drug trafficking are well documented (United Nations 1998). Influential papers study the effect of political (Dell 2015), legal (Dobkin and Nicosia 2009; Gavrilova et al. 2017; Golz and D’Amico 2018; Swanson 2020), and economic shocks (Angrist and Kugler 2008; Dube et al. 2016) to drug trafficking organizations’ activities in local contexts. We depart from this literature by taking a global approach to drug trafficking: using world seizure data allows us to document geographic concentration patterns for all types of drugs. Moreover, we take a broader view on the legal determinants of drug trafficking. We show that economic regulations generating legal opacity enable drug trafficking by providing legal tools to drug traffickers.

These results also complement the literature investigating the role of haven jurisdictions in enabling criminal and morally reprehensible activity beyond tax evasion. Despite recently recurrent leaks providing much anecdotal evidence, such as the Panama Papers, this literature faces the limit of measuring

² Many African countries are integrating more and more global standards of anti-narcotics laws, thereby strengthening detection (see, e.g. United Nations 2009).

flows that are by design hidden or unrecorded.³ Some papers emphasize specific loopholes and regulations that are able to generate forms of regulation avoidance: Johannesen and Zucman (2014) show that increased international cooperation makes banking secrecy inefficient, and Omartian (2017) uses the Panama Papers data to show the same thing for secretive corporate vehicles. Unger and Rawlings (2008) argue that territories like the Seychelles seek to attract and capture rents from illicit financial flows, and van der Does de Willebois et al. (2011) shows how secretive options provided by havens are misused for criminal ends. Andersen et al. (2017) identify capital flight movements by linking oil-rich countries' deposits in tax havens to booms in oil prices, and Andersen et al. (2021) use a similar methodology to establish that aid disbursements increase tax haven deposits from aid-dependent countries. We contribute to this literature by providing evidence that the legal opacity provided by haven jurisdictions has detrimental effects beyond white-collar crimes, extending also to illicit trade.

We do so by constructing a measure that is complementary to other academic measures of haven jurisdictions and vulnerability to illicit flows. The legal opacity index most closely relates to the financial secrecy index (FSI). Cobham et al. (2015) were the first to emphasize and evaluate a complete country-level legal framework generating financial secrecy. This measure is composed of a secrecy score, an index of financial secrecy based on 20 indicators, and a country-level weighting scale based on exports of financial services, combined to measure the impact of financial secrecy. The secrecy score is the best measure of secrecy available to-date, and we make use of some components in the construction of our index. Yet, our contribution differs in several ways. First, our aim is to measure and study the legal opacity services supplied to illicit actors, and we do not weight them by a measure of market success. Second, our focus is different: we want to measure legal opacity favouring illicit economic activity, not only financial secrecy. We focus on economic crime and illicit behaviours. Finally, our coverage differs: we have wider geographic coverage at a lower time frequency.

Our measure relates also to indices by Masciandaro and Balakina (2014). These authors argue that policy-makers implement banking secrecy laws to attract illicit flows, but have to face reputational and criminal costs in return. To proxy countries' actual regulation choices, they build an index of offshore financial centres' (OFCs) attitudes based on multilateral organization membership, presence in institutional blacklists, and advertisement of OFC status. Our measure differs since we measure regulatory choices made by jurisdictions, and not their attitudes. We also depart from measures of vulnerability to illicit flows, such as the Basel AML index. These indicators usually aggregate various causes of illicit flows vulnerability on one scale. This approach is relevant when comparing countries in terms of an ideal anti-money-laundering policy, but less informative for specific supply, demand, institutional, economic, and legal causes of illicit activity. Finally, we differ from the tax haven list of Dharmapala and Hines (2009), often used in the economic literature on illicit financial flows. We focus on other legal advantages provided by haven jurisdictions, and we build a continuous measure from them.

The next section describes the data for our empirical analysis: we detail the drug seizure data as well as the sources and construction of our legal opacity index, and compare it to existing measures. Section 3 develops an illustrative framework of drug seizures and the effects of opacity and anti-narcotics laws. Section 4 describes our empirical strategy to assess the effect of legal opacity on the drug trade. Section 5 presents our results and Section 6 concludes.

³ Cobham and Janský (2020) provide a review of existing methodologies to estimate illicit financial flows. See Ducouloux-Favard (2010) for a collection of criminal case studies using tax havens.

2 Data and facts

In this section we provide information on the data sets and methodology required to build the legal opacity index. The data set covers 184 countries and territories for the periods 2001–10 and 2011–20. Country-level information on legal opacity is merged with detailed information on drug seizures, drug production, anti-narcotics laws, and other relevant country-specific determinants.

2.1 Drug seizures

Seizures are the most readily available indicator of illicit drug supply, and have been collected since the early 2000s by the United Nations. Our empirical analysis makes use of a detailed and unique data set on drug seizures and drug production. Data on drug seizures are taken from the United Nations Office on Drugs and Crime (UNODC). They are primarily obtained from national authorities through the *Annual Reports Questionnaire* of the UNODC. Under the International Drug Conventions, UN member states are formally required to provide national drug control-related information annually to the Secretary General of the United Nations. This information is complemented with other official sources, such as the data provided by the Heads of National Law Enforcement Agencies (HONLEA) or by national and international organizations such as Interpol/ICPO, the World Customs Organization, the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), and the Inter-American Drug Abuse Control Commission (CICAD). Data on the countries that produce cocaine, opium, and cannabis (herb and resin) come from various issues of the *World Drug Reports*.

Our data set includes information for 163 countries and territories over the period 2002–18. It provides information on the volume of seizures in *kilogram equivalent* for 67 drug types (see United Nations Office on Drugs and Crime 2018). Not all drugs are seized everywhere. The estimation sample contains 19,181 observations and is unbalanced mostly because of the geographic concentration of drugs seized at the subregional level. Figures B1 to B7 in Appendix B show the geographic distribution of drug seizures by broad category of drugs: amphetamine-type stimulants (ATS), ecstasy, cannabis resin (hashish), cannabis herb (marijuana), cocaine, opium and its derivatives morphine and heroin, and various other drugs such as opioids or tranquillizers and sedatives. The broad categories of drugs are highly concentrated in UN-classified subregions. The largest seizures of opium and cocaine, and to some extent cannabis, are for instance mostly reported in or close to the main production areas, a factor we will control for in the empirical exercise. The largest quantities of cocaine seized are concentrated in Central America. Most opiates seized are reported in South-West Asia. According to the United Nations Office on Drugs and Crime (2018), opiates seizures in South-West Asia in 2018 accounted for 98 per cent of the global quantity of opium seized, 97 per cent of the global quantity of morphine seized, and 38 per cent of the global quantity of heroin seized that year. Seizures of cannabis, which is one of the most widely trafficked drugs, are more widespread. We note, however, that seizures of cannabis resin are far more geographically concentrated than are seizures of cannabis herb. ATS do not appear significantly in seizure statistics because they are usually produced in, or close to, areas of consumption.

2.2 Legal opacity index

We construct the legal opacity index from various sources, evaluating the economic legal framework for each jurisdiction. We assess the presence of legal secretive loopholes, the lack of transparency regulations and the enforcement of existing ones, the divergence from global norms on economic criminality, and the cooperation in these matters with other jurisdictions. Our index is mostly a *de jure* measure. However, we introduce *de facto* elements on the enforcement of regulations, and on the *de facto* opacity generated by specific administrative dispositions.

Our main sources are the Financial Action Task Force (FATF), the FSI, the Flag Theory website (<https://flagtheory.com>), and the US International Narcotics Control Strategy Report Volume II (INCSR). These cover a large part of the regulations generating opacity. The FATF and INCSR evaluate countries on anti-money-laundering measures through, respectively, 40 recommendations and a large set of indicators. The FSI measures cross-country financial secrecy through a set of 20 secrecy scores. The Flag Theory website gathers a substantial amount of information on country-level offshore services regulations. We complement these sources with specific indicators from the World Bank, the OpenCorporates website, the ILO EPZ database, the UN, and the OECD. Each source is extensively detailed and discussed in Appendix A. The way we combine these sources in our index is presented in Table A1 of Appendix A. To build our opacity index, we first compute measures of four complementary broad dimensions of opacity: banking secrecy, secretive entities, internal policy, and international cooperation.

The first dimension is banking secrecy. We measure whether a jurisdiction has regulations and laws in place that prohibit the disclosure of banking and financial information to a non-authorized party. In several jurisdictions, disclosures are further buttressed by criminal sanctions including fines and imprisonment. Opacity in banking services allows illicit actors to enter and use the formal financial system with the proceeds of economic crime. To properly account for this dimension, we expand the banking secrecy indicator of the Tax Justice Network (KFSI1) to all of the countries in our sample. The index is supplemented with data on whether banks are required to report suspicious or unusual transactions to designated authorities from INCSR. Finally, we complement the measure with information on restrictions on bank account services to non-residents from the Flag Theory website.

The second dimension is secretive legal entities. This dimension measures how the legal environment allows the emergence of legal entities misused for illicit purposes, such as secretive corporate vehicles. These entities are secretive because of missing information on legal and beneficial owners or sources of assets, or because activities are not made readily available to the authorities and the public. As such, they allow criminals to anonymously undertake economic transactions in the formal sector. We measure administrative disclosure requirements for various types of corporations, trusts, and foundations. We complement these data with information on barriers to entity creation, and residency programmes. We use information from OpenCorporates, Flag Theory, the World Bank Indicators, and FATF.

The third dimension covers domestic regulations and policies taken against economic crimes and illicit economic behaviours. It measures the degree of unlawfulness inside jurisdictions for illicit economic behaviours. The deficiencies in the legislative, enforcement, and policy frameworks lower the risks and punishments for criminals undertaking regulatory arbitrage. They also generate opacity by not qualifying as illegal an economic flow that can later be reintegrated in the legal economy. This measure builds mainly on global reviews of the legal framework, such as the FATF recommendations evaluation reports and the INCSR country classifications. We complement these with a measure of special economic zones granting exemptions in national regulations.

Our fourth dimension measures whether a territory is cooperative with others on legal matters. The level of cooperation over legal prosecutions is a relevant factor of opacity: it shields individuals and companies from international pursuit. Jurisdictions known to be uncooperative attract illicit actors by ensuring that little information on their activities can be granted to requesting countries, lowering the probability and cost of punishment. We measure *de jure* mechanisms for legal cooperation, as *de facto* cooperative behaviours of states cannot be observed.⁴ We collect data on the date of ratification of major international treaties that set frameworks for legal cooperation, and we use information on bilateral and multilateral mechanisms for financial information exchanges between countries (on request and automatic exchange

⁴ No state publishes statistics on answered letters of request in a systematic way, for example.

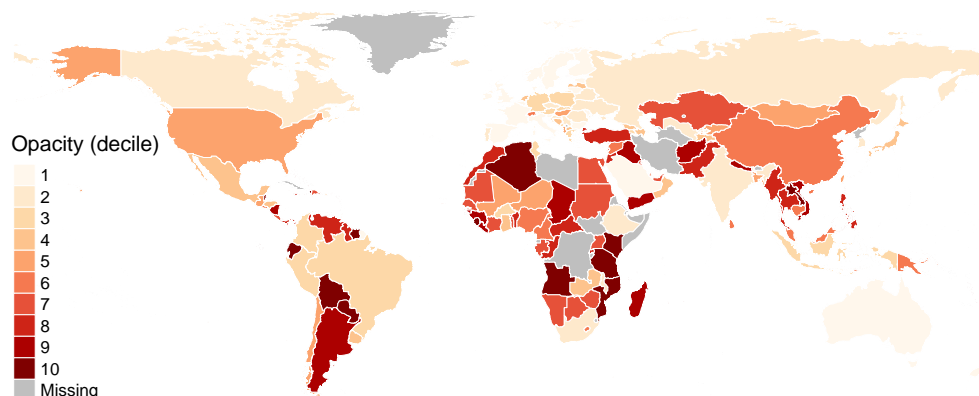
of information). We complement these measures with compliance with FATF recommendations on international legal cooperation, and relevant INCSR indicators.

From each cited element within dimensions, we draw an indicator between 0 and 100. To measure the four broad dimensions of opacity, we weight sources according to their level of detail and comprehensiveness with the dimension definition. We are able to construct the four measures for two points in time—one for each decade in our sample. Figure A1 displays the distribution of each broad dimension: our measures discriminate well between transparent and high-secrecy countries. We also provide in Table A8 correlations between the four broad indices. We find positive and moderate levels of correlation, since our broad dimensions capture different aspects of legal opacity.

The combination of these dimensions of opacity constitutes the legal opacity technology of territories. We build the legal opacity index as the unweighted average of its four dimensions, for two points in time. Countries ratings are standardized on a 0–100 scale, 0 being the lowest opacity score and 100 the highest. As a robustness check, we use a principal component analysis (PCA) to choose the weight associated to each dimension. The first component loads dimensions with similar weights, and the correlation of the average opacity index and the PCA-based opacity index is 0.99.⁵

In Table A9 we report the legal opacity index for each country. Figure 1 displays the spatial distribution of the index deciles. We notice higher legal opacity indices in most African, South-East Asian, and Central and South American countries (dark red). European and North American countries have lower levels of legal opacity (light red). There is, however, opacity variation across countries within these subregions, which we will exploit later.

Figure 1: Legal opacity index deciles (2011–20)



Notes: a darker colour corresponds to a higher decile of legal opacity. Countries in grey are missing from the legal opacity data set due to a lack of underlying data.

Source: authors' construction based on the legal opacity index.

The country ranking in Table A9 confirms the role of secrecy jurisdictions as opacity providers: Hong Kong, Liechtenstein, Lebanon, Liberia, Luxembourg, and Panama display some of the highest levels of opacity. Among the most opaque countries, we also find a few least developed countries such as Afghanistan, Angola, and Laos. As opacity can come either from the willingness or the capacity to

⁵ The first component explains 52 per cent of total variance of our four dimensions.

monitor economic activity through the collection of accurate information, countries with low state administrative capacities tend to rank higher in the legal opacity index.

In Table 1 we display pairwise correlations between our measure of legal opacity $Opacity_{it}$ and close measures from the economic literature. We also define three indicators that take the value of 1 when the legal opacity index falls into the top 10, 20, or 30 per cent of the distribution, and 0 otherwise. Our legal opacity measures display large levels of correlation with the Basel anti-money-laundering index (0.640) and the secrecy score from the Tax Justice Network (0.720) because there is some overlap in data sources.

Table 1: Pairwise correlations: other measures of secrecy jurisdictions

Variables	$Opacity_{it}$	LH_{it} (top 10%)	LH_{it} (top 20%)	LH_{it} (top 30%)
Basel AML index	0.640 (0.000)	0.242 (0.001)	0.386 (0.000)	0.423 (0.000)
Secrecy score (TJN)	0.720 (0.000)	0.366 (0.000)	0.397 (0.000)	0.435 (0.000)
Tax haven (Dharmapala and Hines 2009)	0.109 (0.133)	0.076 (0.297)	0.082 (0.258)	0.066 (0.363)
FSI (TJN)	0.003 (0.976)	-0.038 (0.665)	-0.108 (0.221)	-0.144 (0.103)
Onshore–offshore attitude (Masciandaro and Balakina 2014)	0.384 (0.000)	0.114 (0.119)	0.199 (0.006)	0.256 (0.000)

Source: authors' calculations based on the legal opacity index (Table A9).

All measures based on our index correlate loosely with the tax havens list from Dharmapala and Hines (2009). Opacity is not systematically related to the country's specific tax environment: the indicator of the top three deciles of opaque countries display a correlation of 0.066 with the tax havens list. Our measures moderately and negatively correlate with the FSI: countries with the highest level of opacity are not the biggest exporters of financial services. The legal opacity index is positively correlated with the onshore–offshore attitude index from Masciandaro and Balakina (2014). Territories that are blacklisted by international organizations tend to be opaque. They do not yet entirely correspond to jurisdictions having the highest index of opacity.

In Table 2 we display a correlation of our index with institutional measures from the economics literature. We display first correlations with government effectiveness, rule of law, and control of corruption from the World Governance Indicators (Kaufmann et al. 2010). Our measures are negatively correlated with these three governance measures. There is a strong negative correlation between government effectiveness, a measure of state capacity, and our four measures. We relate this result to the fact that opacity can come from low administrative capacities. The correlation is lower with rule of law and control of corruption.⁶ We find no significant correlation between a democracy indicator built from Polity V (Marshall and Gurr 2020). However, legal opacity is positively correlated with common law (La Porta et al. 2008) and with a colonial past (Mayer and Zignago 2011).

⁶ Legal opacity, however, is not sourced from the pervasiveness of corrupted officials: legal opacity would consist in lowering punishment and allowing some forms of corruption—that is, making corruption less illicit.

Table 2: Pairwise correlations: institutional measures

Variables	$Opacity_{it}$	LH_{it} (top 10%)	LH_{it} (top 20%)	LH_{it} (top 30%)
Government effectiveness	-0.511 (0.000)	-0.198 (0.007)	-0.346 (0.000)	-0.348 (0.000)
Rule of law	-0.491 (0.000)	-0.181 (0.014)	-0.308 (0.000)	-0.351 (0.000)
Control of corruption	-0.438 (0.000)	-0.156 (0.035)	-0.262 (0.000)	-0.284 (0.000)
Democracy	-0.118 (0.104)	0.056 (0.441)	0.014 (0.847)	-0.012 (0.867)
Common law	0.114 (0.122)	0.108 (0.144)	0.105 (0.155)	0.088 (0.234)
Former colony	0.400 (0.000)	0.197 (0.007)	0.235 (0.001)	0.228 (0.002)

Source: authors' calculation based on the legal opacity index (Table A9).

2.3 Other data

We collect information on drug legislation country by country. We scrape all the legislative framework referenced by the UN SHERLOC database. This database provides information on 375 active national law titles from 174 countries. We collect law names, country names, broad topic, date of signature, and implementation for each legal text. We are able to distinguish 40 laws on criminal drug offences, which we classify as anti-narcotics laws. We define an indicator that takes the value 1 for all the years following the signature of an anti-narcotics law. This variable reflects active laws for a country in a given year.

We collect information on drug cultivation across countries. The *World Drug Reports* between 2000 and 2020 provide quantitative and qualitative information on drug-cultivating countries for cannabis, coca, and opium poppy. We hand-code countries each year as major producers of each plant-based drug product, and generate a time–drug–group–country varying indicator for major cultivating countries.

The level of violence is a known driver of illicit drug production level. We control for conflict onset using the UCDP/PRIO Armed Conflict Dataset (Gleditsch et al. 2002; Pettersson et al. 2021).⁷

In its analysis of illicit trade, the OECD (2016) points out that trafficking countries usually face unfavourable economic conditions and corruption, combined with incomplete or weak legislation, weak law enforcement capacity, and a developed infrastructure to accommodate international trade, such as large airports or ports. We use data on these determinants of drug trafficking.

To control for national capacities to detect criminal activity, we use information on militarization in a country from the Bonn International Center for Conversion (Mutschler and Bales 2020). Many countries rely on military forces instead of local police to fight drug trafficking.⁸ The Bonn International Center for Conversion provides three indices: on public spending in relation to GDP and health expenditures, on the share of military personnel in the country, and on the number of armed forces' heavy weapons in relation to the total population. We average these to capture countries' capacities and willingness to invest in internal security and fight against criminal activities.

The level of corruption is an important factor enabling drug trafficking: drug traffickers extensively rely on corrupted customs agents, police forces, and local officials to lower their seizure probability. We

⁷ See Lind et al. (2014) for the effect of violence on Afghan opium production.

⁸ In Mexico, drug trafficking organizations (DTOs) fear military forces, and police force capacities are lowered by corruption (Monnet 2020).

include an indicator of control of corruption from the World Governance Indicators (Kaufmann et al. 2010).

We also control for economic conditions and aggregate income by including per capita GDP. Income is likely to determine both drug production and drug prevalence. The data are taken from the World Bank's World Development Indicators (<https://databank.worldbank.org/source/world-development-indicators>). We complement this series with data from the CIA World Factbook for the small independent territories that are covered by our index.

Porousness of borders is likely to affect trafficking routes and seizure rates: we control for countries' geography, via port infrastructure and landlocked characteristics. Data on the number of ports and their locations are released by the World Port Index (National Geospatial-Intelligence Agency 2019). This publication describes characteristics of 3,630 ports and terminals around the world. We match ports' geographic coordinates to countries in our database, and build an indicator variable for ports on national coastlines. The landlocked indicator comes from the CEPII GeoDist database (Mayer and Zignago 2011).

3 Illustrative framework

We define the seizure rates, $Seizures_{ij}$, as the amount of seizures per capita of a specific drug j in country i . The seizures rate is a fraction of the illicit flows that are detected by security forces and enforcement agencies:

$$Seizures_{ij} = I_{ij} \times \lambda_i \quad (1)$$

where I_{ij} is the total flow of illicit product and λ_i is the detection probability, which is assumed to be identical across different drug types.

Legal opacity. The identification of the impact of legal opacity on drugs trafficking is challenging because a larger amount of drugs seized may reflect two opposite trends: legal opacity decreases the probability of detecting illicit flows and also increases their volumes.

The detection probability λ_i depends on the success of enforcement agencies. It is therefore a function of the legal and regulatory environment and thus of the level of legal opacity: $\lambda_i = f(Opacity_i)$. Detection probabilities are expected to be lower in more opaque countries:

$$\frac{\partial \lambda_i}{\partial Opacity_i} < 0 \quad (2)$$

The amounts of illicit flows transiting i are the sum of imported and locally produced/diverted illicit product:

$$I_{ij} = \sum_n q_{in}$$

with q_{in} the quantity of illicit product j imported in country i from any country n . Illicit trade flows can be modelled by a gravity equation:

$$q_{inj} = \frac{Y_n^j E_i^j}{Y^j} \left(\frac{t_{in}^j}{\Pi_n^j P_i^j} \right)^{1-\sigma} \quad (3)$$

where Y_n^j are the production/diversion of illicit product j in n and E_i^j are the expenditures of country i on illicit product j . Y is world expenditure on illicit product j . Π_n^j and P_i^j are multilateral resistances. This represents the ease of market access for both domestic buyers i and foreign sellers n . $\sigma > 1$ is the elasticity of substitution among different varieties of illicit products.

We assume illicit traders pay a smuggling cost t_{in} of the iceberg type when trading between i and n . t_{in} is a function of the probability of detection and the legal punishment that arises when caught trafficking. We assume variable smuggling costs. Illicit traders seek to compensate for the quantities seized by authorities—that is, to adjust for detection probability and to minimize extra costs from potential legal punishments. Legal opacity decreases both the quantities seized by authorities and the extra costs from legal punishment. It has therefore a negative impact on smuggling costs. Given $\sigma > 1$, we find $\frac{\partial \ln q_{inj}}{\partial Opacity_i} > 0$ and therefore:

$$\frac{\partial \ln I_{ij}}{\partial Opacity_i} > 0 \quad (4)$$

I_{ijt} depends positively on the level of legal opacity because it decreases the smuggling costs. High seizure rates may reflect a larger volume of drugs in circulation and more drugs trafficking in more opaque countries.

Anti-narcotics laws. The enforcement of anti-narcotics laws has effects on the flows of illicit drugs and on the probability of detection. It affects positively the detection probability by allocating drug-detection resources to best target the flows of illicit drugs smuggled into countries. Anti-narcotics laws have a detrimental impact on illicit trade flows through two effects: deterrence and incapacitation (Becker 1968; Chalfin and McCrary 2017). Concerning the effect on deterrence, the enforcement of anti-narcotics laws raises the costs of perpetuating illicit drug trafficking. It reduces the likelihood of potential traffickers engaging in illicit drug activities. Regarding the incapacitation effect, anti-narcotics laws incapacitate drug traffickers by taking them out of circulation. While it has a negative impact on illicit trade flows, the incapacitation effect has a mechanical and positive impact on the amount of drug seizures as traffickers lose their spoils.

4 Empirical analysis

We conduct an empirical analysis that allows us to identify the average effects of legal opacity and the enforcement of anti-narcotics laws on drug trafficking across countries. Because the dependent variable is the volume of drugs seized per capita, the ordinary least squares (OLS) method will not be adequate for at least two reasons. First, the variation in population sizes across the volume of drugs seized leads to violating the assumption of homogeneity of error variance because the precision of the estimated seizure rates depends on the size of the population. We expect larger errors of prediction for seizure rates based on small populations than for rates based on large populations. Second, normal distributions of seizure rates cannot be assumed when the volumes of drug seizures are small—some are equal to zero. This suggests that inferences drawn on log-linear regressions may produce misleading conclusions. We use the Poisson maximum likelihood (PPML) estimator proposed by Silva and Tenreyro (2006), which solves the issue of heteroscedasticity and nonlinearity. The estimated model is as follows:

$$Seizures_{ijt} = \exp \left[\alpha_1 Opacity_{ig(t)} + \mathbf{X}_{it}' \alpha + \chi_{k(i)jt} \right] \times u_{ijt} \quad (5)$$

The dependent variable $Seizures_{ijt}$ refers to the seizure rates of a specific drug j in country i in year t . The level of opacity is measured using our index of legal opacity, $Opacity_{ig(t)}$, which is available for each country at two points in time—for the first and second decades of our sample. We report the results using the main index, which is the unweighted average of all four dimensions of legal opacity. We show they are qualitatively similar when using an alternative index based on a PCA.

\mathbf{X}_{it} includes other important determinants that influence the seizure rates, and helps to identify the effect of legal opacity on drug trafficking. We add controls for anti-narcotics laws and flag countries that produce opium, cocaine, or cannabis.

In robustness checks, we add controls for the perception of corruption, an index related to the country's capacity to fight criminal activities, a control for the onset of conflicts, and controls for geography, port infrastructure, and the country's level of development.

$\chi_{k(i)jt}$ are drug \times year \times UN subregions fixed effects to account for detailed subregional trends by type of drug. Figures B1–B7 in Appendix B display high levels of spatial concentration of drug trafficking by drug types. Regions may experience different shocks on a type of drug at different periods of time. The fixed effects allow us to compare the legal opacities across countries for a given subregion, drug, and sector. u_{ijt} is the error term. Throughout our empirical investigation the standard errors are clustered at the country level.

5 Results

Columns (1)–(5) of Table 3 show the results of the PPML regressions. All specifications include a full set of drug–year and subregion-specific effects to control for unobserved characteristics. The effects are therefore identified within drug–year and subregion and across countries.

Table 3: Drug seizure rates: PPML estimates

Dep. variable	Drug seizure rates				
	(1)	(2)	(3)	(4)	(5)
Opacity index	0.033*** (0.010)				
Legal haven (top 30%)		1.131*** (0.310)			
Legal haven (top 25%)			0.954** (0.394)		
Legal haven (top 20%)				1.031*** (0.386)	
Legal haven (top 10%)					0.870** (0.367)
Anti-narcotics law	0.871*** (0.322)	0.814** (0.331)	0.707** (0.316)	0.662** (0.314)	0.807*** (0.305)
Supply country	0.488*** (0.120)	0.439*** (0.132)	0.466*** (0.131)	0.449*** (0.126)	0.456*** (0.107)
Region \times drug type \times year FE	Yes	Yes	Yes	Yes	Yes
Observations	19,282	19,282	19,282	19,282	19,282
Pseudo- R^2	0.458	0.455	0.453	0.455	0.455
Number of countries	165	165	165	165	165

Note: the dependent variable, $Seizure_{ijt}$, is the per capita kilogram equivalent of drug j seized in country i in year t . Panel data (yearly) for 2002–18. PPML estimates. Robust standard errors adjusted for clustering by country. Standard errors are in parentheses. ***, **, * significantly different from 0 at the 1, 5, and 10 per cent levels, respectively.

Source: authors' compilation.

In column (1) we find that countries that are more legally opaque are seizing more drugs per capita than are more transparent countries. The effect of legal opacity is positive and significant at the 99 per cent confidence level. This result suggests that the negative effect of legal opacity on the probability of detection is more than compensated for by its positive effect on the volume of illicit drug flows. We find that an improvement in the legal opacity index by one standard deviation (21.48) would lead to a statistically significant decrease in drug seizure rates by 1.032 per cent. In columns (2)–(5) we define the legal havens as countries that belong to the top percentile of the distribution of the opacity index. The positive and significant estimate implies that, all else being equal, the drug seizure rate in legal havens is about 139–210 per cent higher than in non-havens. High seizure rates are therefore consistent with more drug trafficking in the most opaque countries.

The effect of anti-narcotics laws on drug seizure rates is positive and significant, and is robust across specifications. It implies that, all else being equal, countries that enforce anti-narcotics laws increase their seizure rates compared to countries without enforcement. The effect is large in magnitude, from about 94 per cent to about 139 per cent. This finding suggests that the enforcement of sanctions and penalties to counter drug trafficking is effective.

Across specifications we also include a dummy variable that indicates whether the country is a producer of opium, cocaine, or cannabis. All else being equal, we find larger seizure rates in drug-producing countries relative to non-production countries. The seizure rates' premia vary between 55 and 63 per cent across specifications. This confirms that drug trafficking is more prevalent in production countries.

5.1 Robustness

Columns (1)–(4) of Table 4 show the results of PPML regressions that include country-level controls. We also include a full set of drug–year and subregion-specific effects. In Table C1 we use an alternative definition of the opacity index. All results present similar magnitudes, and remain statistically significant.

Table 4: Drug seizure rates: PPML estimates (robustness)

Dep. variable	Drug seizure rates			
	(1)	(2)	(3)	(4)
Opacity index	0.027*** (0.010)	0.025** (0.011)	0.024* (0.012)	
Anti-narcotics laws	0.834** (0.326)	0.844*** (0.275)	0.804*** (0.284)	0.765*** (0.287)
Supply country	0.401*** (0.120)	0.465*** (0.116)	0.465*** (0.115)	0.407*** (0.125)
Ports	1.024** (0.489)	1.624*** (0.533)	1.606*** (0.533)	1.863*** (0.422)
Landlocked	1.178 (0.867)	1.669 (1.075)	1.704 (1.089)	1.985* (1.043)
Corruption		0.665*** (0.256)	0.659*** (0.252)	0.749*** (0.281)
GDP per capita (log)		−0.398 (0.278)	−0.377 (0.276)	−0.469* (0.280)
Internal conflicts		0.365 (0.507)	0.341 (0.494)	0.395 (0.368)
Military apparatus			−0.059 (0.475)	0.028 (0.474)
Legal haven (top 30%)				1.120** (0.560)
Region × Drug type × Year FE	Yes	Yes	Yes	Yes
Observations	19,282	19,161	18,724	18,724
Pseudo- R^2	0.461	0.476	0.477	0.479
Number of countries	165	160	154	154

Note: the dependent variable, $Seizure_{ijt}$, is the per capita kilogram equivalent of drug j seized in country i in year t . Panel data (yearly) for 2002–18. PPML estimates. Robust standard errors adjusted for clustering by country. Standard errors are in parentheses. ***, **, * significantly different from 0 at the 1, 5, and 10 per cent levels, respectively.

Source: authors' compilation.

In column (1) we include the indicators for ports and landlocked countries as additional variables. Both variables enter the specification positively. The port variable is statistically significant across specifications. Our results indicate that having ports more than doubles the seizure rates. The landlocked variable is not significant in most specifications, except in column (5) in which we substitute the opacity index by the legal haven indicator. Given our control for production countries, the positive effect of the landlocked indicator suggests that drugs may be trafficked through landlocked countries.

In column (2) we add a control for the perception of corruption in the country. This control is important as corruption is an important factor explaining the development of criminal networks.⁹ We find corruption to have a positive and significant impact on drug seizure rates. The introduction of the corruption indicator alters only marginally the estimate of legal opacity and anti-narcotics laws. We also include controls for the level of development, using GDP per capita, and the onset of conflict. All else being equal, the onset of conflict does not impact drug seizure rates. GDP per capita has a negative and significant impact in column (5), suggesting lower seizure rates in richer countries.

In column (3) we add an index of the country's military apparatus, which informs on the country's capacity to fight criminal activity. The military index is not significant at the conventional level of significance. Note that the introduction of the military index reduces the level of significance. This is mostly due to the reduction in the estimation sample and the loss of observations related to relatively opaque tax haven countries.¹⁰

In column (4) we substitute the opacity index by the legal haven dummy variable. We find a positive and significant effect of the legal haven indicator. The magnitude of the effect is similar to the one found in the baseline regression.

5.2 Anti-narcotics law enforcement in neighbouring countries

The main gateway for drug trafficking into countries are neighbouring countries. Stricter counter-narcotics law enforcement in neighbouring countries may influence a country's drug seizure rates by diverting illicit flows. The enforcement of anti-narcotics laws in neighbouring countries may also be the result of stronger cooperation between countries in order to increase the probability of detection. We construct a variable that informs on the share of neighbouring countries that enforce anti-narcotics laws. We investigate whether a stricter environment at home and abroad affects drug seizure rates. As this effect might be larger in countries that have a greater degree of legal opacity, we interact the new variable on anti-narcotics laws in neighbouring countries with the country's degree of opacity.

The results of the estimations are reported in Table 5. Since our effect is identified within drug-year and subregion, we compare countries surrounded by a larger share of neighbours with enforced anti-narcotics laws to countries with a smaller share of neighbours with enforced anti-narcotics laws. In columns (1) and (2) we present the results of the estimations that use the opacity index. In columns (3) and (4) we use the legal haven indicator that informs on the most opaque countries.

In columns (1) and (3) counter-narcotics laws in neighbouring countries increase drug seizure rates. The inclusion of the variable has little effect on other covariates except the indicator for landlocked countries. The landlocked country coefficient is positive and becomes statistically significant at the 99 per cent level of significance for the first time. This result suggests that illicit drug flows are diverted to landlocked countries. These countries might be the final destinations of those flows.

In columns (2) and (4) we report the results that use an interaction between the country's degree of opacity and anti-narcotics laws in neighbouring countries. We find positive interaction coefficients. However, we find a statistically significant effect only when we consider the most opaque countries—that is, the interaction with the legal haven indicator. These results suggest that the enforcement of anti-narcotics laws in neighbouring countries has a stronger positive impact on drug seizure rates in most opaque countries. This effect might be due to larger diverted illicit flows and better detection probabilities.

⁹ We do not have the series for Gibraltar, Montserrat, and Turks and Caicos Islands, and so lose these countries.

¹⁰ We do not have information on the military index for Aruba, Anguilla, Bermuda, British Virgin Islands, Cayman Islands, Gibraltar, Hong Kong, Macau, Montserrat, Puerto Rico, and Turks and Caicos Islands.

Table 5: Anti-narcotics laws in neighbouring countries: PPML estimates

Dep. variable	Drug seizure rates			
	Opacity index		Legal haven (top 30%)	
	(1)	(2)	(3)	(4)
Opacity	0.025*	0.022*	1.031**	0.838*
	(0.013)	(0.014)	(0.466)	(0.434)
Anti-narcotics laws	0.868***	0.898***	0.812***	0.837***
	(0.310)	(0.313)	(0.304)	(0.303)
Anti-narcotics laws (neighbouring countries)	3.736**	0.814	3.290**	2.016***
	(1.673)	(1.469)	(1.295)	(0.722)
Opacity \times anti-narcotics (neighbouring countries)		0.062		2.823**
		(0.046)		(1.400)
Supply country	0.498***	0.508***	0.425***	0.440***
	(0.130)	(0.132)	(0.129)	(0.131)
Ports	1.800***	2.094***	2.045***	2.268***
	(0.408)	(0.341)	(0.337)	(0.276)
Landlocked	1.953***	2.123***	2.299***	2.518***
	(0.702)	(0.568)	(0.585)	(0.416)
Corruption	0.692***	0.750***	0.776***	0.826***
	(0.246)	(0.248)	(0.275)	(0.266)
GDP per capita (log)	-0.363	-0.419	-0.450*	-0.492*
	(0.255)	(0.261)	(0.258)	(0.253)
Internal conflicts	0.406	0.332	0.427	0.325
	(0.384)	(0.402)	(0.341)	(0.352)
Military apparatus	0.035	0.155	0.099	0.155
	(0.496)	(0.532)	(0.480)	(0.492)
Region \times drug type \times year FE	Yes	Yes	Yes	Yes
Observations	18,724	18,724	18,724	18,724
Pseudo- R^2	0.484	0.485	0.485	0.487
Number of countries	154	154	154	154

Note: the dependent variable, $Seizure_{ijt}$, is the per capita kilogram equivalent of drug j seized in country i in year t . Panel data (yearly) for 2002–18. PPML estimates. Robust standard errors adjusted for clustering by country. Standard errors are in parentheses. ***, **, * significantly different from 0 at the 1, 5, and 10 per cent levels, respectively.

Source: authors' compilation.

6 Conclusion

In this paper we develop a new measure of a country's degree of legal opacity. The index is based on detailed information from institutional sources, official statistic registers, and legal online data; it covers various factors of the legal environment that influence the degree of legal opacity. Our index translates variation in legal systems along four opacity dimensions: banking secrecy, legal vehicles, internal policies, and international cooperation. The measure is available for 184 territories for 2001–10 and 190 for 2010–20. The opacity index is complementary to existing measures in the literature: it does not correlate with measures of tax havens and offshore financial centres, and correlates positively with existing measures of secrecy and illicit flows. Our index still has some limitations. First, drawing on the most comprehensive sources for all jurisdictions implies constructing broad categories of opacity. Jurisdictions are evaluated through criteria generic enough to assess worldwide legal systems, and we could miss some specific sources of opacity or specific laws. Moreover, we faced a trade-off between time precision and geographic coverage due to data limitations. Our index can be used to study variation across legal systems.

We see the illegal drug sector as a good set-up to estimate the effect of opacity on illicit flows. We use data from the UNODC on seizures of drugs by country, drug, and time. We investigate the role of opacity in generating and enabling illegal trade flows. To our knowledge this is the first attempt to study the role of countries' legal opacity in trafficking flows. Using seizures data is challenging but is relevant for our conceptual framework: seizures are both the result of illicit flows and of their detection.

We account for those two effects and provide an illustrative framework that disentangles them. The worldwide coverage of UNODC data allows drawing findings on international flows of narcotic drugs. We find that within a subregion, for a given drug and a given year, legal havens seize more than twice as much as non-havens. We interpret this result as a positive effect of opacity on flow sizes, that offsets any negative effect of opacity on seizures through detection. This result is robust to country-level economic and geographic controls. It is also robust to controlling for the enforcement of anti-narcotics laws in neighbouring countries.

At a time when critical voices are heard on the world's War on Drugs, it is in our view essential to understand monitoring and anti-narcotics policy enforcement.¹¹ Policy-makers should assess the relevance of drug policies to their legal frameworks: territories with higher levels of opacity face higher levels of international illicit flows.

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¹¹ The International Drug Policy Consortium recently concluded that UN-promoted policy on drug trafficking had failed to reduce the illicit drug market and its adverse consequences (International Drug Policy Consortium 2018).

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Appendix A: legal opacity index—data sources

To construct our index of legal opacity, we combine data retrieved from several sources.

We use information from the FATF, which sets international standards to prevent criminal abuse of the financial system. These international standards come through a set of recommendations to fight money laundering and terrorist financing, initiated in 2002 (49 items) and updated in 2012 (40 items). The recommendations deal with the legal and institutional framework of the country, and the powers and procedures of the competent authorities. The 2012 standards also include 11 criteria on the effectiveness of regulations, to identify the extent to which a country achieves a set of outcomes. The FATF and its regional bodies provide country ratings on the degree of technical compliance with each recommendation in a synthetic table of reports evaluating the overall anti-money-laundering environment of each country: the Mutual Evaluation Reports (MERs). Ratings vary between non-compliant, partially compliant, largely compliant, and compliant. We collect this tabular content for 199 countries and territories over the period 2000–20, and convert each recommendation or effectiveness rating on a 0–100 scale. We collect by hand MERs ratings on the first set of recommendations, and ratings on the second set are consolidated and released by the FATF. MERs are published in different years for each country: we compute one observation per recommendation–country–decade set by averaging when several MERs took place during the same decade, and extrapolating when countries were not evaluated during a decade. Evaluations on the first set of recommendations are associated to 2000–10, and the second set to 2010–20. Each of the recommendations is associated to the corresponding dimension.

We complement the data set using information from the INCSR from the US Department of State (2020). Each report ‘describes the efforts to attack all aspects of the international drug trade, chemical control, money laundering and financial crimes.’ We only make use of report volume 2, which focuses on financial crime. Interestingly, the reports provide binary indicators from 2000 to 2020, with gaps, on various features legal systems that favour opacity. We collect 28 binary indicators for 212 territories. We use some of these indicators as components of our dimensions. Volume 2 of the INCSR report also provides a classification of countries as being of primary, secondary, or tertiary concern regarding economic crime, which we collect. This classification provides a global rating of countries’ legal environments regarding economic crime.

We use KFSIs from the TJN (Cobham et al. 2015). The secrecy score of the FSI is based on precise 20 KFSIs evaluating opacity components. These measures are available for 60 countries and territories in 2009 and 133 countries in 2020. The TJN provides all sources, references, and methodology for each of the 20 components. We use the KFSI1 on banking secrecy to build our first dimension, and expand this measure to our sample of countries over the two decades. When sources are missing, we use close corresponding INCSR indicators and search corresponding text laws.

We gather information on treaties constituting the international legal framework on economic crime (transnational organized crime, corruption, and the financing of terrorism). We measure participation in three major international treaties and conventions: the International Convention for the Suppression of the Financing of Terrorism, the UN Convention on Transnational Organized Crime, and the UN Convention Against Corruption. These treaties set up international standards regarding economic crime and implement mechanisms for legal cooperation. Their ratification reflects the presence of these mechanisms as well as cooperative behaviours. From the UN Treaty Collection platform (<https://treaties.un.org>) we collect the signature and ratification and extension dates of treaties for each territory. The platform records accession of independent territories to treaties, which might be different than for the mainland (for the Channel Islands and for the UK, for example). For each treaty, territory, and year, we build a binary variable equal to 1 if the territory signed and ratified a treaty. We take the average of the indicator by territory and decade, and we build an average measure over treaties.

We collect data on mechanisms of exchange of financial information. Exchange of financial information reduces opacity by providing information on financial ownership to foreign jurisdictions. At the beginning of the century exchange of information on request mechanisms was embedded in bilateral treaties. We collect the list of such treaties, partners, signature and enforcement dates, and binding mechanisms (paragraphs 4 and 5 of OECD model treaty) from the Flag Theory website. We measure the average number of bilateral relationships per country and decade, and count non-binding mechanisms as half a relationship. In the second decade automatic exchange of information is implemented through the Multilateral Convention on Mutual Administrative Assistance in Tax Matters. Finally, we measure the automatic information exchange through FATCA, a US initiative. We collect the number of countries implementing an intergovernmental agreement under FATCA, its model, and the date of enforcement from the US Treasury website (<https://home.treasury.gov>). Table A6 displays the weighting of each element.

We use data on reviews made by the OECD Global Forum on Transparency and Exchange of Information for Tax Purposes (<https://www.oecd.org/tax/transparency>). The Global Forum evaluates the capacity of countries to implement effective information-exchange mechanisms, by rating availability of information, ease of access to information, and practices of exchange of information. Ease of access to information is informative on financial secrecy barriers that might exist and is used as a component of KFSI1. We collect and make use of detailed ratings, as well as overall assessments, in Table A6.

We collect data on free economic zones around the world. Free zones are geographic or regulatory spaces where economic activity is subject to fewer legal regulations and controls (customs, production norms, taxation, etc.). Free zones introduce more lenient internal regulations and can be used as a secrecy component. Systematic and comparable data across existing free zones is scarce. Therefore, we rely on count variables for now, using two data sources. First, we use the EPZ database from the ILO (Singa Boyenge 2007). This database lists existing export-processing zones by country in 2007, and provides qualitative data on goods processed and major markets supplied. We then collect data from the Wikipedia page ‘List of Free Economic Zones’ (https://en.wikipedia.org/wiki/List_of_free_economic_zones), and count the number of existing zones by country. Using those two lists makes sure we do not miss existing free zones because of definition issues. Table A7 displays the freeport scale for each database, which we average per country.

Finally, we gather data on the use of secretive vehicles and legal structures. The World Bank Doing Business data set provides several indicators on business regulation. We select indicators evaluating opacity of business structures. We make use of the Extent of Corporate Transparency Index, and of the Starting a Business time and procedure variables. The Extent of Corporate Transparency Index measures, on a 0–100 scale, the public disclosure of information regarding corporations, such as ownership, public accounts, and auditing. The Starting a Business time and procedure variables indicate the number of days and administrative procedures required to open a limited liability company in each jurisdiction. We rate countries with a combination of very short entry time and low number of procedures with a high score (see the scoring matrix in Table A2). Doing so, we assume that this proxies for the ability of the administration to detect fraudulent information in business establishments when secretive structures are available in a jurisdiction.

We complement these data with information from the Open Company Data Index computed by the OpenCorporates website, a platform centralizing all available information on incorporated companies across the world. This index measures, on a continuous scale, the extent of public information (ownership, directors, accounts, etc.) freely available in all jurisdictions for limited liability companies. We extend the index following their methodology by collecting information from countries’ company registries agencies online if information is missing.

Finally, we scrape information from specialized websites advertising offshore services: Flag Theory and Offshore Protection (<https://www.offshore-protection.com>). These websites from offshore services providers display information on the characteristics of secretive entities worldwide. From this and previously published information accessed through the Wayback Machine (an internet archive) we construct binary indicators on corporate, trusts, and foundation structures regulations for each territory. Table A3 details the combination of these indicators. We cannot ensure that this information is exhaustive, but we assume that this process provides us with data on the main secretive structures.

Each variable or indicator constructed from the exposed sources is converted on a 0–100 scale, and is used in the dimension construction with the appropriate weight. Table A1 provides the composition and weighting scheme for each dimension.

Table A1: Dimensions of the legal opacity index (sources and weight)

Dimension	Source(s)	Weight
<i>Banking secrecy indicators</i>		
<input type="checkbox"/> Extended KFSI1: banking secrecy	FSI & complementary sources	0.6
<input type="checkbox"/> Advertised foreign bank account indicator (Table A4)	Flag Theory	0.3
<input type="checkbox"/> INCSR indicators (average): <i>Report suspicious transactions</i> <i>Report suspected terrorist transactions</i>	INCSR volume 2	0.1
<i>Secretive (corporate) vehicles</i>		
<input type="checkbox"/> Open Company Data Index	OpenCorporates	0.3
<input type="checkbox"/> Advertised offshore structure indicator (Table A3)	Offshore Protection websites & Flag Theory websites	0.25
<input type="checkbox"/> FATF recommendations: <i>old rec.: 12, 16, 33, 34</i> <i>new rec.: 22, 23, 24, 25</i>	FATF MERs	0.15
<input type="checkbox"/> Corporate Transparency Index	World Bank	0.15
<input type="checkbox"/> Entry time & procedures (Table A2)	World Bank	0.075
<input type="checkbox"/> Advertised residency programme indicator (Table A5)	Flag Theory	0.075
<i>Domestic policies</i>		
<input type="checkbox"/> FATF recommendations: <i>excluding recommendations used to rate other dimensions</i>	FATF MERs	0.45
<input type="checkbox"/> INCSR classification Primary concern: 100 Secondary: 75 Monitored: 50	INCSR volume II	0.3
<input type="checkbox"/> INCSR indicators (average): <i>Crim. of drug ML, Crim. of ML beyond drugs, Crim. terrorist financing, KYC provisions, FIU Ability to freeze terrorists' assets</i>	INCSR volume II	0.125
<input type="checkbox"/> Freeports & Free zones index	ILO EPZ database, online references freeports	0.125
<i>International cooperation</i>		
<input type="checkbox"/> Ratification of major treaties: <i>International Convention for the Suppression of the Financing of Terrorism, UN Convention Transnational Organized Crime, UN Convention Against Corruption</i>	United Nation Treaty Collection	0.3
<input type="checkbox"/> Exchange of financial information: <i>EOIR & AEOI (Table A6)</i>	Flag Theory, Global Forum US Treasury, OECD	0.3
<input type="checkbox"/> FATF recommendations: <i>old rec.: 36, 37, 38, 39, 40</i> <i>new rec.: 37, 38, 39, 40, IO2</i>	FATF MERs	0.2
<input type="checkbox"/> INCSR indicators (average): <i>Int. Law Enforcement Cooperation, Arrangements for Assets Sharing, Party to 1988 UN Drug Convention,</i>	INCSR volume II	0.2

Note: some corrections are implemented when countries display missing values. When indicators are missing for territories with legal autonomy (such as British overseas territories or the Netherlands Antilles), we assign the value of the mainland.

Source: authors' compilation based on data.

Weights: elements within dimensions vary in their level of detail and comprehensiveness of dimension extent. We weight each source according to these characteristics. Take the domestic policy dimension: we rely on FATF recommendation evaluations, INCSR country classifications and indicators, and free zones and freeports indices. FATF recommendations evaluate countries on a wide range of criteria: because of this precision we give these evaluations the highest weight. INCSR classification provides a broad rating of a country's policy against illicit financial flows, but rates countries with only four grades: we give a lower weight to these data. Finally, INCSR indicators evaluate a precise but small set of

criteria, and the freeport index broadly counts specific areas and rates a lot of countries with a 0 score. We give them the lower score.

Table A2: Entry barriers

		Entry time			
		top 50 %	top 25 %	top 10%	top 5%
Entry Procedures	top 50 %	12	12	33	6
	top 25 %	12	12	50	66
	top 10 %	33	50	66	83
	top 5 %	6	66	83	100

Note: cases not covered by the matrix are rated 0.

Source: authors' compilation.

Table A3: Advertised offshore structure index

Criteria	Score	Criteria	Score
Presence on offshore services website	10		
Offshore company		Offshore foundation	
Any type of offshore company	8.3	Any type of offshore foundation	0.83
Non-disclosure of shareholders	8.3	Corporate founder	0.83
Non-disclosure of directors	8.3	Corporate council member	0.83
No annual returns	8.3	No protector required	0.83
No local director	8.3	No local regulated person required	0.83
No audited accounts	8.3	Founder not disclosed	0.83
Corporate shareholders permitted	3.75	Council members not disclosed	0.83
Corporate directors permitted	3.75	Protector not disclosed	0.83
No local secretary	3.75	Beneficiary not disclosed	0.83
No annual meeting	3.75	Merge permitted	0.83
Redomiciliation allowed	3.75	Redomiciliation permitted	0.83
Electronic signature allowed	3.75	Registered agent permitted	0.83
Audit exemptions	3.75		
No exchange control	3.75		

Note: when multiple structures exist we choose the most secretive one to rate the corresponding territory. Weighting is decided based on availability of information: criteria discussed by multiple sources are associated with higher weight to ensure reliability of information.

Source: authors' compilation.

Table A4: Advertised foreign bank account indicator

Criteria	Score	Criteria	Score
Firm bank account		Personal bank account	
Presence on offshore services website	6	Presence on offshore services website	6.6
Offshore company eligible	9	Number of currencies	6.6
Non-resident company eligible	9	Personal visit not required	6.6
Foundation eligible	9		
Resident company eligible	9	Wealth management bank account	
Number of currencies	9	Presence on offshore services website	6.6
Personal visit required	9	Number of currencies	6.6
		Personal visit	6.6

Note: when multiple structures exist we choose the most secretive one to rate the corresponding territory.

Source: authors' compilation.

Table A5: Advertised offshore residency indicator

Criteria	Score	Criteria	Score
Passport or residency programme			
Presence on offshore services website	12.5	Personal visit not required	12.5
Dual citizenship	12.5	Language skills not required	12.5
Family members included	12.5	Interview not required	12.5
Land ownership allowed	12.5	Physical residence required	12.5

Note: when multiple structure exist we choose the most secretive one to rate the corresponding territory.

Source: authors' compilation.

Table A6: Exchange of information process

Criteria	Score
Number of EOIR links	0–25
<i>Maximum number of bilateral links rated 0</i>	
<i>Minimum 100</i>	
Review of EOIR process	0–25
<i>Compliant review 0</i>	
<i>Non-compliant 100</i>	
FATCA participation	0–15
<i>IGA in force 100</i>	
<i>50 if model 2</i>	
Number of bilateral AEOI links	0–35
<i>Maximum number of bilateral links rated 0</i>	
<i>Minimum 100</i>	

Source: authors' compilation.

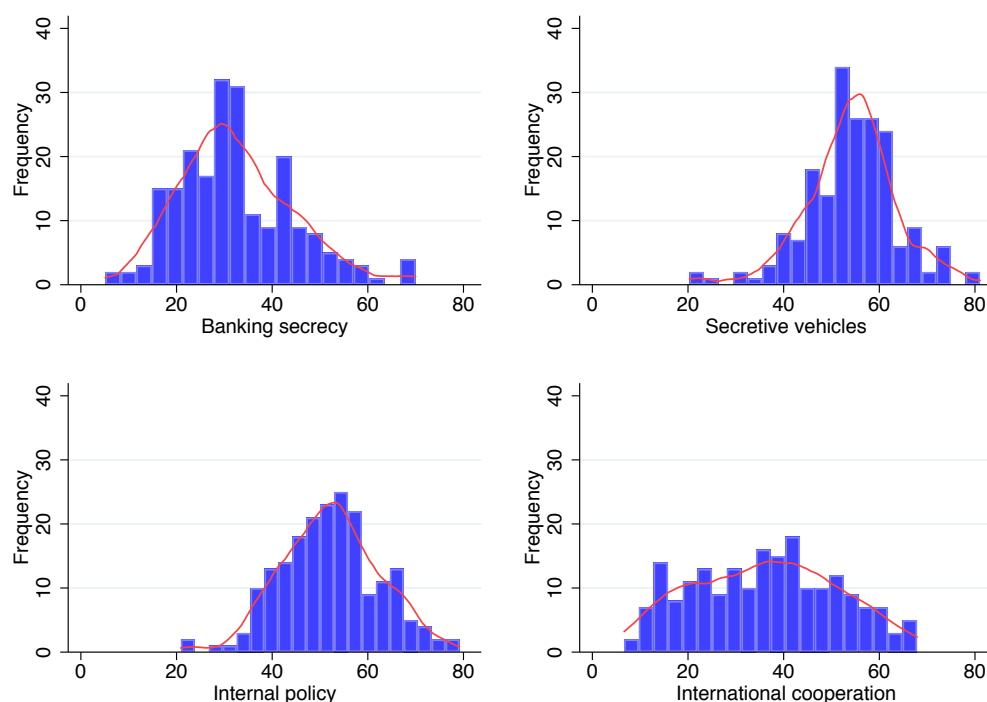
Table A7: Freeports scale

EPZ number	Score	Free zones Number	score
0	0	0	0
1 other type	0.4	1	0.6
1	0.6	2	0.7
2	0.7	3–5	0.8
3–5	0.8	6–25	0.9
6–20	0.9	>25	1
>20	1		

Source: authors' compilation.

Figure A1 displays the distribution of each broad category. Our research objective is to distinguish between secretive jurisdictions and less secretive countries and territories, and our dimensions discriminate well between transparent and high-secrecy countries.

Figure A1: Distributions of each broad categories



Source: authors' compilation.

Table A8 is the correlation matrix of the four broad categories. The correlations vary between 0.270 and 0.422. The positive and moderate level of correlation between the four broad categories reveals that countries do not develop the same sources of legal opacity.

Table A8: Correlation tables

Variables	Bank. secrecy	Secret. vehicles	Internal policy	Int. cooperation
Banking secrecy	1.000			
Secretive vehicles	0.315	1.000		
Internal policy	0.325	0.366	1.000	
International cooperation	0.422	0.270	0.328	1.000

Source: authors' compilation.

Table A9: Legal opacity index (2011–20)

Index	Country	Index	Country	Index	Country	Index	Country
100	Laos	66.86	Myanmar	55.61	Niger	40.06	Cyprus
99.14	Tanzania	66.66	Brunei	55.52	Albania	39.24	Malta
95.70	Saint Lucia	66.26	Panama	55.29	Chile	38.87	Slovak Republic
95.60	Paraguay	65.73	Rwanda	55.27	Trinidad and Tobago	38.01	Austria
95.32	Belize	64.97	Guyana	54.58	San Marino	37.99	Poland
94.52	Comoros	64.94	Turkey	54.42	Barbados	37.67	Burkina Faso
90.07	Maldives	64.68	Jamaica	54.33	United States	37.52	Montenegro
89.51	Algeria	64.44	Thailand	54.30	Fiji	36.66	Indonesia
87.62	Hong Kong	64.38	Pakistan	54.16	Turks and Caicos Islands	36.37	Greece
85.85	Kenya	64.38	Uganda	53.92	Samoa	36.17	Ethiopia
85.73	Saint Kitts and Nevis	64.22	Sudan	53.90	Marshall Islands	36.15	British Virgin Islands
84.30	Haiti	64.12	Gibraltar	53.79	Guatemala	36.13	South Korea
83.81	Angola	63.97	United Arab Emirates	52.71	Bangladesh	35.82	Serbia
83.65	Sierra Leone	63.80	Togo	52.53	Hungary	35.48	Croatia
83.39	Mozambique	63.78	Kuwait	52.52	Cayman Islands	35.45	Romania
83.36	Ecuador	63.77	Luxembourg	52.23	Taiwan	35.18	Jersey
82.28	Grenada	63.76	Botswana	52.20	Kyrgyz Republic	34.17	Canada
82.26	Bolivia	63.07	Namibia	50.87	Mongolia	33.76	India
82.02	Suriname	63.03	Cote d'Ivoire	50.54	Mali	33.32	Belarus
81.70	Dominica	62.86	Zimbabwe	49.81	Mexico	32.26	Czech Republic
81.52	Afghanistan	62.77	Lebanon	49.72	Japan	31.57	Ukraine
81.43	Vietnam	62.49	Costa Rica	48.86	Honduras	31.20	Portugal
80.79	Liberia	62.45	Senegal	48.79	Singapore	31.11	Malawi
80.44	Guinea	62.32	Mauritania	48.01	Bosnia and Herzegovina	30.60	Bermuda
80.31	Vanuatu	62.27	Egypt	47.78	Azerbaijan	30.38	Russia
79.45	Guinea-Bissau	62.06	Kazakhstan	47.75	Georgia	29.96	South Africa
79.26	Bahamas	61.88	Gabon	47.51	Uruguay	29.95	Uzbekistan
78.93	Nepal	61.85	Dominican Republic	47.37	Latvia	24.33	Iceland
78.84	Sao Tome and Principe	61.65	Curaçao	46.79	Zambia	23.50	Italy
78.62	Yemen	61.43	Lesotho	46.78	Netherlands	23.35	Australia
78.50	Chad	61.26	Papua New Guinea	46.18	Anguilla	22.49	Estonia
77.64	Antigua and Barbuda	60.65	Sri Lanka	45.21	Tajikistan	21.85	New Zealand
76.42	Madagascar	58.89	Qatar	45.01	Puerto Rico	21.11	Israel
74.72	Argentina	58.83	Cameroon	44.90	Oman	19.89	Saudi Arabia
73.81	Iraq	58.65	Syria	44.59	Macedonia	19.06	Spain
73.45	Mauritius	58.63	Palau	44.39	Montserrat	19.01	France
73.29	Gambia	58.31	Malaysia	44.22	Ghana	18.17	Ireland
72.58	Nicaragua	58.21	Tonga	43.46	Bahrain	17.96	Moldova
72.32	Seychelles	57.45	Nigeria	43.42	Germany	17.90	Lithuania
71.78	Congo	57.31	Cambodia	43.34	Armenia	17.47	Sweden
71.50	Venezuela	57.22	Aruba	42.92	Cook Islands	16.74	Finland
71.42	Jordan	56.64	Sint Maarten	42.36	Isle of Man	14.50	Bulgaria
71.16	Philippines	56.49	Cape Verde	42.02	Peru	12.51	Belgium
70.79	Benin	56.17	Switzerland	41.57	Macao	7.73	Denmark
70.29	Saint Vincent and the Grenadines	56.09	Timor	41.37	Brazil	5.09	United Kingdom
69.33	Morocco	56.02	China	41.31	Guernsey	3.75	Slovenia
69.33	Liechtenstein	55.72	El Salvador	40.39	Tunisia	0	Norway
68.54	Central African Republic			40.14	Colombia		

Source: authors' compilation.

Table A10: Legal havens (30%)

2001–10	2011–20
Afghanistan, Algeria, Angola, Antigua and Barbuda, Argentina, Bahamas, Belize, Bolivia, Chad, Comoros, Congo, Dominica, Ecuador, Guinea, Guinea-Bissau, Haiti, Hong Kong, Kenya, Laos, Liberia, Maldives, Morocco, Mozambique, Myanmar, Nepal, Pakistan, Panama, Paraguay, Saint Kitts and Nevis, Saint Lucia, Sao Tome and Principe, Seychelles, Sierra Leone, Suriname, Tanzania, Thailand, Vanuatu, Venezuela, Vietnam, Yemen, Bangladesh, Cambodia, Costa Rica, Dominican Republic, Gabon, Mali, Mongolia, Namibia, Papua New Guinea, Sri Lanka, Tajikistan, Timor, Uganda, United Arab Emirates, Zambia	Afghanistan, Algeria, Angola, Antigua and Barbuda, Argentina, Bahamas, Belize, Bolivia, Chad, Comoros, Congo, Dominica, Ecuador, Guinea, Guinea-Bissau, Haiti, Hong Kong, Kenya, Laos, Liberia, Maldives, Morocco, Mozambique, Myanmar, Nepal, Pakistan, Panama, Paraguay, Saint Kitts and Nevis, Saint Lucia, Sao Tome and Principe, Seychelles, Sierra Leone, Suriname, Tanzania, Thailand, Vanuatu, Venezuela, Vietnam, Yemen, Benin, Brunei, Central African Republic, Gambia, Grenada, Guyana, Iraq, Jamaica, Jordan, Liechtenstein, Madagascar, Mauritius, Nicaragua, Philippines, Rwanda, Saint Vincent and the Grenadines, Turkey

Source: authors' compilation.

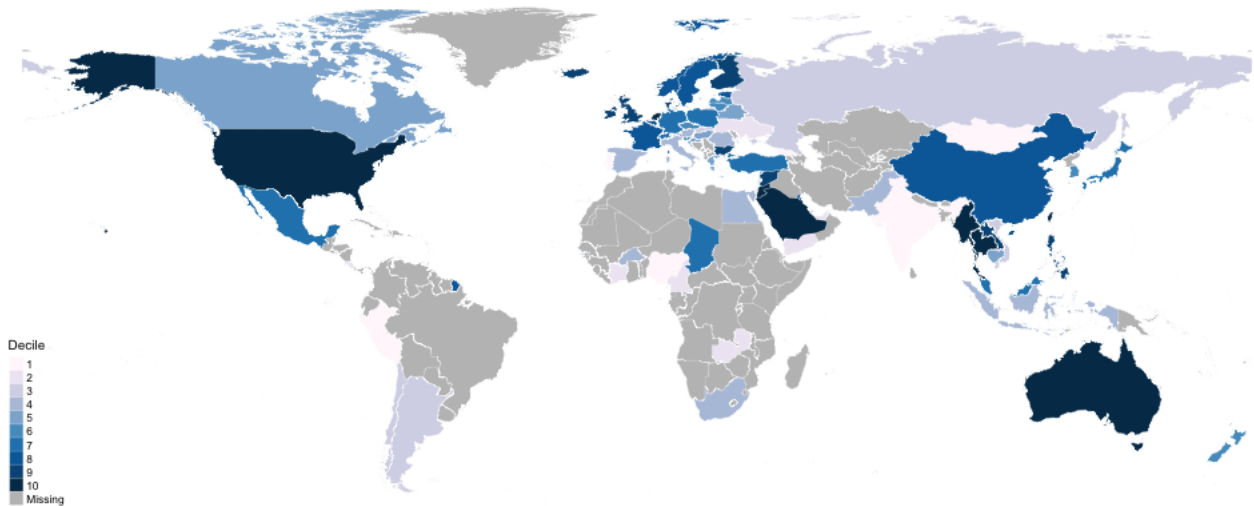
Table A11: Pairwise correlations

Variables	Banking secrecy	Secretive vehicles	Internal policy	International cooperation
Basel AML index	0.310 (0.000)	0.289 (0.000)	0.529 (0.000)	0.7160 (0.000)
Secrecy score (TJN)	0.586 (0.000)	0.540 (0.000)	0.217 (0.012)	0.638 (0.000)
Tax haven (Dharmapala & Hines 2009)	0.284 (0.000)	0.254 (0.000)	−0.116 (0.103)	−0.204 (0.004)
FSI (TJN)	0.129 (0.140)	0.008 (0.932)	0.005 (0.956)	−0.152 (0.081)
Onshore–offshore attitude (Masciandaro and Balakina 2014)	0.324 (0.000)	0.431 (0.000)	0.055 (0.445)	0.166 (0.021)

Source: authors' calculation based on opacity index data (Table A9).

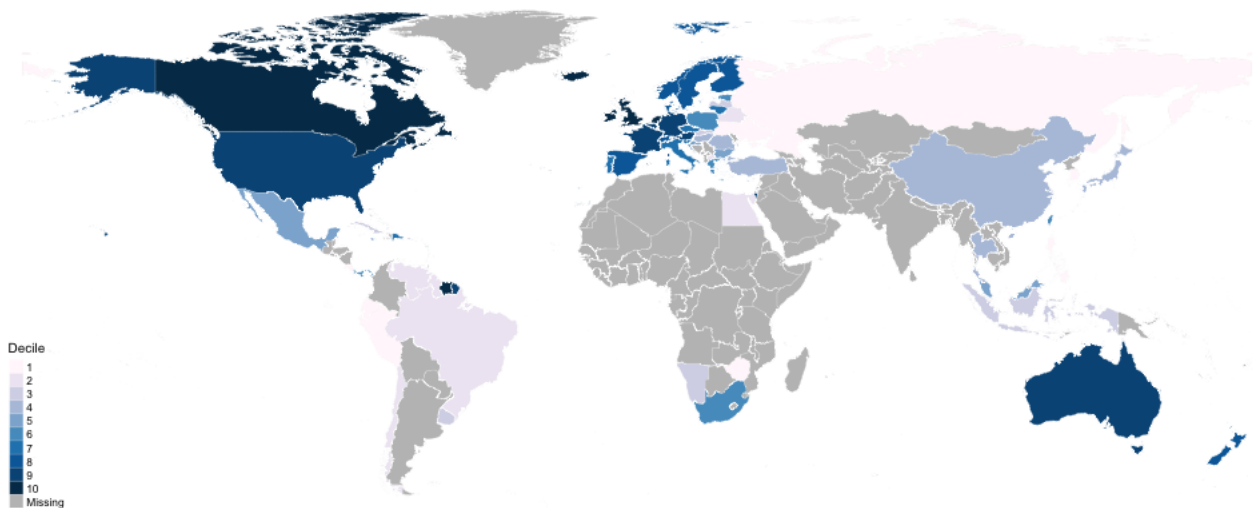
Appendix B: drug seizures

Figure B1: ATS, excluding ecstasy, seizures (kg per capita)



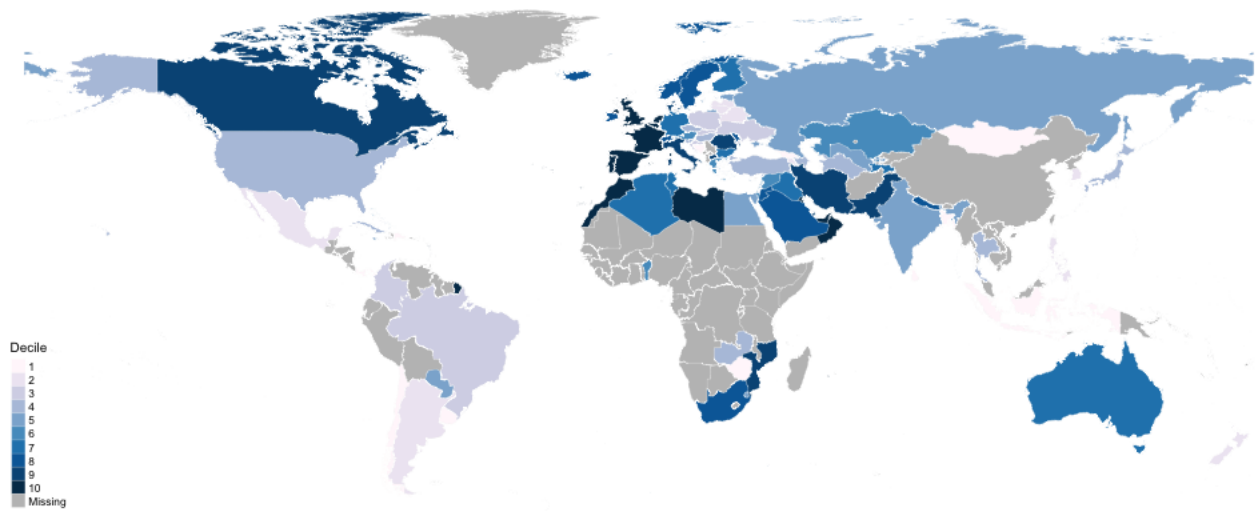
Source: authors' compilation based on UNODC data.

Figure B2: Ecstasy seizures (kg per capita)



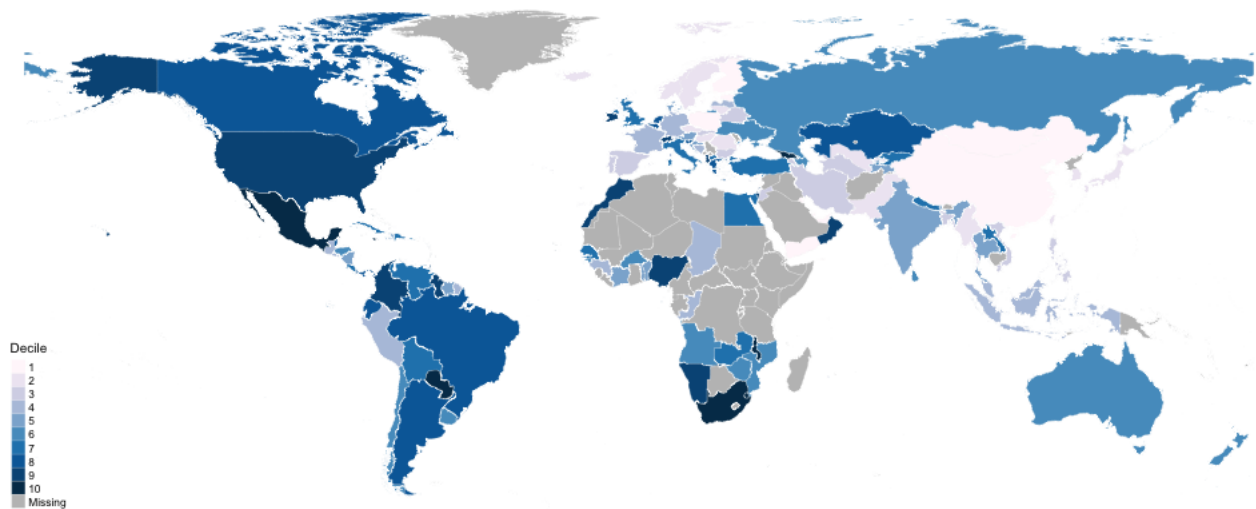
Source: authors' compilation based on UNODC data.

Figure B3: Hashish seizures (kg per capita)



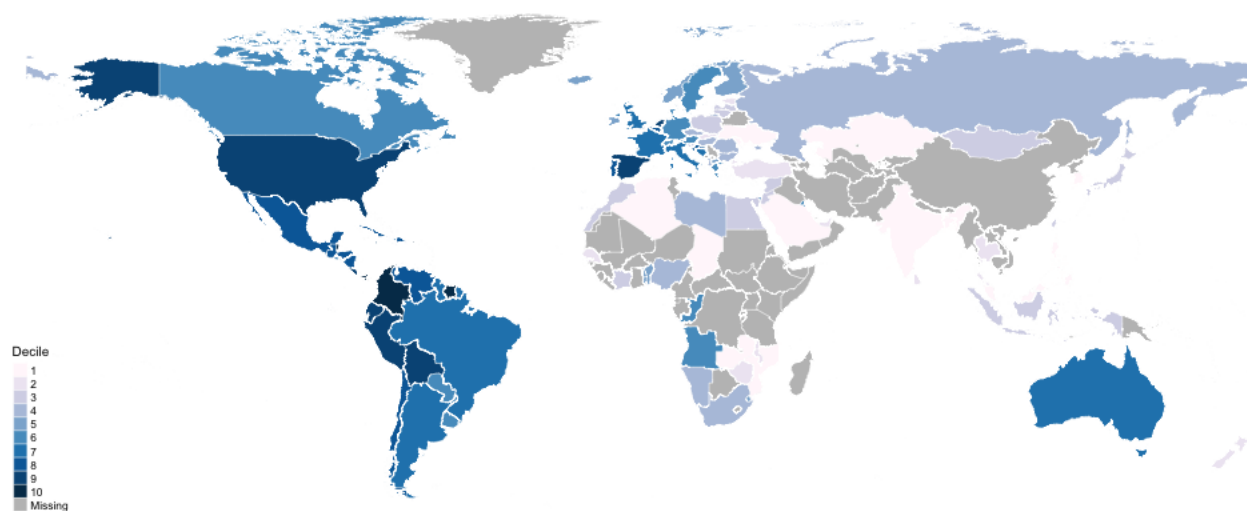
Source: authors' compilation based on UNODC data.

Figure B4: Marijuana seizures (kg per capita)



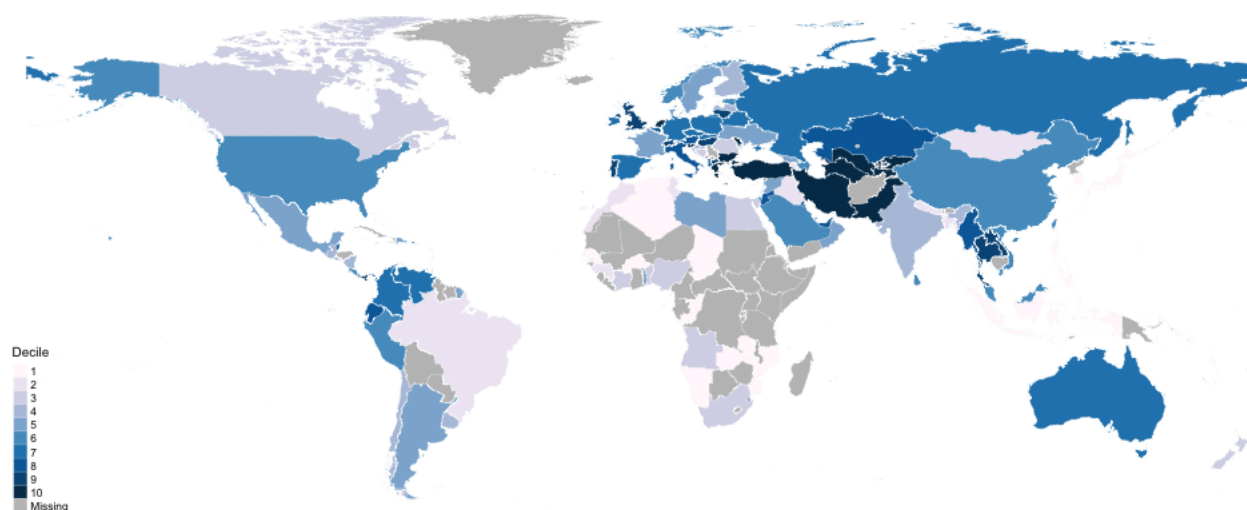
Source: authors' compilation based on UNODC data.

Figure B5: Cocaine seizures (kg per capita)



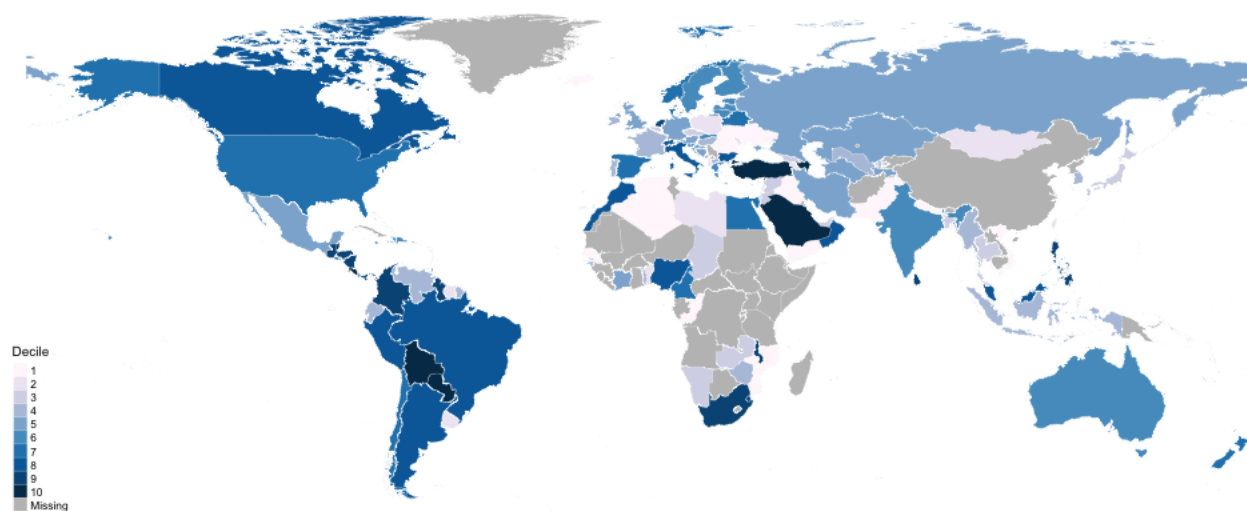
Source: authors' compilation based on UNODC data.

Figure B6: Opiates seizures (kg per capita)



Source: authors' compilation based on UNODC data.

Figure B7: Other drugs seizures (kg per capita)



Source: authors' compilation based on UNODC data.

Appendix C: robustness—index weighting

In Table C1 we test how changing the weights used to construct the opacity index affects our results. The index rests on four dimensions. Within each dimension, several items are collections of different vectors of information. For example, KFSI1, advertised foreign bank account, Open Company Data Index, advertised offshore structures, FATF recommendations, INCSR classification, ratification of majors treaties, and exchange of financial information are matrices of information that collect many different variables. We call them *wide sources*. All other items are specific measures of legal attributes. We call them *specific sources*. We first use an alternative rule to weight sources within dimensions. We define three alternative indices.

1. Within each dimension, we take the mean of wide sources and of specific sources, and we weight each component by respectively 0.75 and 0.25. We take the mean of the four dimensions to build *AltWeights*. This rule allows us to take into account the hierarchy between them due to information precision and richness.
2. *NoDim* is an alternative index. We apply the same rule, but we drop the dimension partition.
3. *EqSources* is a third indicator. We weight all data sources equally, which we expect to be less precise.

In columns (1), (2), and (3), we introduce all alternative indices with the baseline specification. The coefficients are positive and magnitudes are higher for indices (2) and (3), which do not use a dimension partition. All coefficients are statistically significant. When we introduce country-level controls in columns (2), (4), and (6), the size of all coefficients decreases. However, only coefficients associated to indices *AltWeights* and *NoDim* are statistically significant at the 5 per cent level. This result suggests that some items of legal opacity are more relevant than others when examining the impact of legal opacity on illicit trade flows.

Table C1: Drug seizure rates: PPML estimates

Dep. variable	Drug seizure rates					
	(1)	(2)	(3)	(4)	(5)	(6)
Opacity index (<i>AltWeights</i>)	0.038*** (0.011)	0.028** (0.012)				
Opacity index (<i>NoDim</i>)			0.091*** (0.027)	0.070** (0.035)		
Opacity index (<i>EqSources</i>)					0.068** (0.030)	0.012 (0.042)
Anti-narcotics laws	0.805*** (0.312)	0.769*** (0.287)	0.842** (0.333)	0.735** (0.287)	0.836** (0.332)	0.783*** (0.291)
Supply country	0.471*** (0.118)	0.448*** (0.112)	0.474*** (0.119)	0.457*** (0.115)	0.479*** (0.126)	0.411*** (0.108)
Ports		1.675*** (0.527)		1.543*** (0.544)		1.750*** (0.511)
Landlocked		1.709 (1.077)		1.716 (1.124)		2.293** (1.009)
Corruption		0.672*** (0.260)		0.698*** (0.244)		0.692** (0.274)
GDP per capita (log)		−0.433 (0.273)		−0.359 (0.272)		−0.470 (0.312)
Internal conflicts		0.278 (0.478)		0.404 (0.442)		0.034 (0.586)
Military apparatus		−0.056 (0.479)		−0.047 (0.496)		−0.359 (0.483)
Region × Drug type × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	19,282	18,724	19,282	18,724	19,282	18,724
Pseudo- R^2	0.458	0.477	0.457	0.477	0.450	0.473
Number of countries	165	154	165	154	165	154

Note: the dependent variable, $Seizure_{ijt}$, is the per capita kilogram equivalent of drug j seized in country i in year t . Panel data (yearly) for 2002–18. PPML estimates. Robust standard errors adjusted for clustering by country. Standard errors are in parentheses. ***, **, * significantly different from 0 at the 1, 5, and 10 per cent levels, respectively.

Source: authors' compilation.