REPORT

Understanding illicit drug markets, supply-reduction efforts, and drug-related crime in the European Union

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RAND EUROPE

Preface

The European Drugs Strategy concentrates on demand reduction and supply reduction through international cooperation and research, information and evaluation. However, efforts to provide insight into the different aspects of Europe's illicit drug problems have largely focused on indicators developed to assess demand-side strategies. The development of measures capturing dimensions of the supply of different illicit substances is an emerging field in the EU. To advance these efforts, the European Commission DG Justice, Freedom and Security commissioned RAND Europe to recommend indicators for improving the understanding of illicit drug markets, supply-reduction efforts, and drug-related crime in the EU. This document presents the results of this effort.

We anticipate that this document will be of interest to policymakers from the European Commission, as well as other governmental bodies which are concerned with measuring the effectiveness of their drug supply-reduction strategies. It will also be of interest to law enforcement agencies, forensic laboratories and international organisations focusing on drug markets and organised crime. We believed it will also be a valuable resource for researchers with a specific interest in the policy analysis of drugs markets.

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Introduction

Considerable efforts have been made to collect useful information about the demand and supply of illegal drugs at the international, national and sub-national levels in Europe. However, given the difficulty in developing reliable indicators of supply for an illegal market, most of the successes have been in developing measures of demand and the harms associated with consumption. The contributions made by the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) in the development of accurate and standardised information across the 27 Member States stand out as exemplary and essential. The demand-side data collected by the EMCDDA provide policymakers with invaluable information that can be used to evaluate the effectiveness of a plethora of policies and programmes intended to reduce drug use and related harms throughout Europe.

The development of measures capturing dimensions of the supply of different illicit substances has been considerably slower, but they now form an emerging field of study in the EU. The EMCDDA is leading many of these efforts and has made significant progress in assembling aggregated data on the retail price and purity of illicit substances. Although various law enforcement agencies frequently report information on seizures, arrests and, less frequently, purity and price, current data collection efforts are insufficient to support careful analyses of these markets in a manner that would enable one to understand the effect of specific supply-side strategies. To advance these efforts, the European Commission DG Justice, Freedom and Security commissioned RAND Europe to recommend indicators for improving the understanding of illicit drug markets, supply-reduction efforts, and drug-related crime in the EU.

The insights and recommendations presented in this report were informed by international meetings with scientific and policy experts; key informant interviews; detailed case studies; results from a survey of forensic labs; RAND's previous work on drug markets and drug-related crime in third countries; and a review of the academic and grey literatures. The number of conferences held and reports published in this field have proliferated in the past year and there appears to be more publications coming soon.

The key insights that emerge from our review of the literature, our own work and our conversations with European experts, include the following:

1. More coordinated efforts to collect information about purity-adjusted prices is critical for understanding the efficacy of supply-reduction strategies.

2. There are at least two approaches that could be used within the EU to improve the collection of purity-adjusted price information.

3. Member States would be better served by adopting a common protocol for reporting seizure data.

4. It is difficult to generate reliable estimates of the crime burden associated with the supply and use of prohibited drugs.

Based on these key insights and a conceptual framework for thinking about the supply chain for drugs, we developed some immediate-term, near-term and long-term recommendations to assist the European Commission in their goal of monitoring drug markets and drug-related crime. We will now describe in greater detail the key insights and then discuss the recommendations that are shaped by them.

Key insights

Insight 1. More coordinated effort to collect information about purity-adjusted prices is critical for understanding the efficacy of supply-reduction strategies, particularly the impact of specific law enforcement activities

When thinking about the relationship between demand and supply of an illegal drug like cocaine, heroin or methamphetamine, it is important to distinguish between two types of prices: raw prices and purity-adjusted prices. If someone purchases a 1g bag of heroin on the street for €75, the raw-price per gram is €75. However, we know that heroin purchased at the retail level is usually diluted by dealers trying to expand their profit margin and dealers often do not necessarily know the precise purity of what they are selling. Thus, it would not be unusual if a gram of heroin purchased for €75 in one part of the city was 20 percent pure and in another place it was 30 percent pure. In this example, the purity-adjusted prices would be €375 per pure gram of heroin (€75/0.2) and €250 per pure gram of heroin (€75/0.3), respectively.

To truly understand what is being traded and to appropriately monitor and analyse these markets, one needs to know not just the amount traded and the raw (gross) amount paid, but also the purity of the drug that was traded. If law enforcement agencies successfully reduce supply in a region, drug-dealers actually have two potential responses depending on the drug being sold: 1) they could respond by raising their monetary prices for the same drug they were selling before to account for the fact that there is now a shortage in supply, or 2) they could maintain their current price and dilute the product that they sell. Building on the example from above, the dealer who sold €75 one-gram bags at 30 percent purity could add diluents to account for the reduced supply and now sell it at 20 percent. In this case the purity-adjusted retail price will increase by 50 percent (from €250 to €375). However, if law enforcement simply examined the raw-price per gram, it will look as if the law enforcement intervention had absolutely no effect.

Most law enforcement agencies within Europe provide information on raw prices to EMCDDA and UNODC. Not surprisingly, because of the rigid nature of nominal prices

for drugs exchanged in drug markets, there usually is not much variation in the reported price from year to year. Agencies are far less likely to report information on purity-adjusted prices, yet purity is the attribute of drugs that changes quite demonstratively across locations and time (Caulkins, 1994; Arkes *et al.*, 2004). Thus, purity-adjusted prices, which normalise nominal prices of a drug by the average purity of the drug contained in that package, provide a lot more information regarding how drug markets react and respond to shocks.

Throughout the report we reference studies conducted by analysts that use the variation in purity-adjusted prices to understand whether and how law enforcement influences the supply of drugs in particular markets and/or and drug consumption. An important lesson learned from these studies is that markets can and do rebound quickly, even from major supply shocks. Thus, purity-adjusted price data collected and/or reported in infrequent intervals (for example, annually) may not be terribly useful for identifying the effects of supply strategies on markets. However, annual data are much better than no data.

Insight 2. There are at least two approaches that could be used within the EU to improve the collection of purity-adjusted price information

While a growing number of surveys across the world inquire about how much users paid for illegal drugs (especially for cannabis) for a specific quantity of the good (such as a gram or an ounce), this information is only of limited value since these surveys do not ask about the purity of the purchase. The actual value of the drug is a function of quantity purchased, price paid and the purity of the drug. But even if surveys did inquire about purity, this information would likely be limited as most sellers and users do not know the precise quality of what they are exchanging (Caulkins, 1994; Caulkins *et al.*, 2004; Ben Lakhdar, 2009). Thus, information on purity-adjusted prices cannot come solely from self-reported surveys. That being said, self-reported information about price per *raw gram* is now being used in very innovative ways to generate information about purity-adjusted prices (see Appendix A).

The most common approach currently used by law enforcement and policymakers to obtain information on purity-adjusted prices is to obtain transaction-level information from law enforcement agencies. In some jurisdictions, law enforcement agencies will not only record the price paid and total quantity purchased during an undercover drug operation, but will also send the seized drug to a lab for purity testing. In addition, some jurisdictions will send undercover law enforcement officials to several different places and see how much of a drug they can purchase for a fixed price, with no intention of making an arrest. This product will then be sent to the laboratory for purity testing and often for signature testing to determine where the product came from.

In both of these cases, we can use the transaction level data to calculate the purity-adjusted price:

$$(1) \qquad \textit{Price per pure gram} = \textit{(Total price paid)}/\textit{(Number of grams*Purity)}^{\beta}$$

where β measures the extent of quantity discounts in the market (Caulkins and Padman, 1993). But if we want to create a price series that more accurately captures the prices faced by users, then we need to account for the fact that users usually do not know the purity of what they are buying – they make their decisions based on the expected purity. RAND

developed a method for using these transaction-level data to generate a price series that accounts for expected purity (Caulkins *et al.*, 2004). This approach has since been adopted by other researchers (Institute for Defense Analyses, 2008).

While transaction-level information from law enforcement agencies is preferable for generating purity-adjusted prices, it may not be feasible for some Member States to collect this information, especially in the short run. In some countries there are economic barriers, legal barriers, or both. In these cases we must consider alternative measures. A second strategy proposed within this report (presented fully in Appendix A by Caulkins and colleagues) is to merge available high frequency purity information from seized drugs examined in forensic laboratories and self-reported raw price information and construct purity adjusted prices. Since many EU countries submit seized drugs to labs for purity testing and some surveys already inquire about self-reported prices, acquiring this data would not require a tremendous outlay of resources.

While some countries can obtain this from forensic lab tests of seizures, there are alternative methods for obtaining purity data. For example, pill testing has been available at dance parties across Europe for more than a decade (Kriener *et al.*, 2001). As for other drugs, the French Monitoring Centre for Drugs and Drug Addiction conducted a study where they interviewed heavy cannabis users and then asked respondents to 'donate' a small amount of their cannabis so it could be sent to a lab and tested (Ben Lakhdar, 2009). While this provides 'proof of concept' for obtaining purity information from non-law enforcement efforts, it is critical to remember that the purity data must be collected frequently if they are to be used to understand markets and law-enforcement efforts.

A critical issue to consider when using forensic data to develop a purity series is the method through which the observations are acquired (that is, undercover purchases versus seizures). If forensic data only come through seizure information made at entry points into the EU or a given Member State, then it might not actually reflect the range of purities available at the street level. Evidence from the System To Retrieve Information from Drug Evidence (STRIDE) database, which includes both seizure observations as well as transactions involving money, shows this to be true in the US data. In work that RAND conducted for the Office of National Drug Control Policy, we examined purity data based only on purchase transactions and found that the expected purity of the exchange varied substantially depending on the level of the market in which the transaction was made (Arkes *et al.*, 2004; Caulkins *et al.*, 2004).

Keeping that point in mind, the value of collecting purity information through acquisitions that make it to a forensic lab for analysis would be an important starting point for generating a time series in any location. When purity information is coupled with semi-regular information on raw price paid, which could be obtained through local population surveys, interviews with injection drug users, or even through questionnaires administered at the intake to treatment, one could construct information on purity-adjusted prices for specific areas at relatively low cost. Regardless of the approach, it is preferable to collect this

price information at multiple points (for example monthly or quarterly) throughout the year.[1]

Insight 3. Member States would be better served by adopting a common protocol for reporting seizure data

As described in greater detail in Chapter 4, law enforcement seizures of illicit drugs serve at least four purposes, they:

1.   increase the deterrent effect on transporting drugs (product loss and identification of people to prosecute)

2.   impose costs on suppliers, which is believed to increase price (and hence reduce demand)

3.   generate information about the geographic flow of drugs into markets and the participants[2]

4.   provide a performance measure for law enforcement agencies.

With respect to the amount of illegal drugs actually seized by law enforcement:

> the quantity seized is a function of at least three factors: (1) the quantity shipped, (2) the relative skill of the interdictors, and (3) the care taken by smugglers (Reuter, 1995).

These factors provide an insight into how a change in seizures over time can relate to the actions of interdictors. A decrease in seizures over time can occur either because the enforcement agency becomes *more effective* and deters suppliers from trafficking drugs in their jurisdiction or because the enforcement agency has become *less effective* and is unable to interdict the same number of shipments.

The utility of this information for policy purposes, however, can be greatly enhanced depending on how much information is collected about each seizure and how this information is maintained in databases. Types of information that are particularly useful for quantitative analyses include: date of seizure; location of seizure; reason for seizure (e.g. discovered during arrest or undercover purchase, passive or targeted); method and mode of transportation; number and nationality of persons arrested; origination of drug; expected destination of drug; type of drug; weight, number of packages (e.g. 1 kilo or 100 bags of crack) and, as previously mentioned, purity (if sent to a lab); and a type of identification code that would make it easier to link related seizures. With this information, a variety of indicators could be created that can be used to better track changes in drug markets, including:

- total number of seizures
- total weight seized
- expected and actual average purity, by source country, time and market level

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[1] The sample sizes required for these calculations will depend on the measure being examined, the size of the difference the analyst would like to detect, and the desired level of precision. See Chapter 3 for more details.

[2] One could also obtain this type of information if there was a database of shipments that were not seized (e.g. from wire tap information). We thank Jon Caulkins for this insight.

- distribution of seizure weights (minimum, maximum, average, mode, variance) by country, drug, time and market level
- share of seizures coming from different countries, and regions (would be more accurate if there is a signature programme)
- drugs and possibly other illicit goods that get moved/distributed together.

Learning about the number of different types of drugs or illicit goods obtained in a seizure can help law enforcement understand when certain trafficking routes are being used for multiple purposes or if specific traffickers are moving into new lines of business. Additionally, information on the distribution of seizures (min, max, median, mean, and variance as well as actual number of seizures on specific dates) in a specific location over time provides information regarding the relative importance of specific routes and whether there is seasonality in transporting of drugs through specific routes. Beyond collecting purity information, obtaining signature information about where the drugs are coming from can help determine whether average purity is changing in response to a shortage or excess supply, or if purity is changing because the source of the drug has changed and the new source has a different purity (implying a change of purity that is independent of domestic market enforcement activities). Law enforcement can also benefit from forensic analyses that attempt to link individual seizures and/or delivery mechanisms (e.g. false-bottom suitcases).[3]

Unfortunately, no common protocol for reporting seizure data among the Member States currently exists. Most countries report information about the total number of seizures and the total weight to international organisations such as the EMCDDA or the United Nations Office on Drugs and Crime (UNODC). Some countries do report seizure-specific data to the UNODC on a biannual basis, but no information is available on the purity of these seizures. While it is encouraging that the Pompidou Group has recommended that seizure-level data reported to Customs be made available for analysis by those in the Liaison offices (Personal communication with EMCDDA officials), Member States should come to an agreement on a protocol so that more of this information can be incorporated into EMCDDA's annual statistical bulletin and made available for analysis.

Insight 4. It is difficult to generate reliable estimates of the crime burden associated with the supply and use of prohibited drugs
Drug-related crime encompasses violations associated with prohibition and any illicit activity caused by consumption or participation in the supply of these prohibited substances. Thus, it is useful to think about this construct in terms of drug law *offences* and the *consequences* of drug consumption (e.g. acquisitive crime) and drug-trafficking (e.g. corruption of border officials). While it is important to make sure that definitions of drug-related crime are not too exclusive (e.g. it should consider the corruption that is often caused by the trafficking organisation), the focus should be to generate measures that help us better understand the magnitude of the burden imposed by drug-related crime.

To better understand the crime burden associated with prohibited drugs, RAND developed a model that considers each stage of the drug supply chain, how they are related

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[3] The Serious Organized Crime Agency incorporated this into Project Endorse, the new seizure UK database program. See Chapter 6 for more details.

to types of crime, and the actors involved. The conceptualisation and categorisation of crimes presented in Figure S.1 are based broadly on a growing understanding of drug markets and how they operate in particular parts of the world.[4] Supply-side, drug-related crime involves illegal activities in the support of the cultivation, processing, manufacturing, distributing, transporting or delivery of a drug to a market and/or consumer. This would include, in addition to the activities just mentioned, the forgery and falsification of documents; bribery; money laundering; use of coercive force or threat to support the cultivation, production, manufacturing, shipment or delivery of a drug; hiding of a product or intermediate products; manufacturing of precursor chemicals or other intermediary products used in the production or manufacturing of drugs; and the shipment/transportation of drugs within a country, region or across international borders. This would also include the violence sometimes associated with acquiring drugs or money, enforcing contracts or collusion, and deterring new suppliers from entering the market. These crimes are especially important when considering advanced models that do not assume perfect competition.

The user-related drug crimes most commonly studied by researchers are at the bottom of Figure S.1. Researchers analyse these crimes, because Member States are able to better track many of these forms of crimes. The demand-side, drug-related crime comprises activities that support the acquisition of an illegal substance, support the consumption of illegal substances, or is caused by the use of that drug (both perpetuated crimes and victimisation). This includes, but is not limited to, the purchase of drug paraphernalia, property crime, physical assault and prostitution. It also includes activities that result from being under the influence of a drug, such as sexual or physical assault, driving a car or other heavy machinery under its influence, domestic violence or intimate partner violence, and child abuse or neglect.

A simple examination of Figure S.1 provides insights into the difficulties of trying to construct indicators of drug-related crime in any jurisdiction. While much attention is given to offences associated with prohibition (e.g. possession and sales), those associated with generating revenue to obtain drugs (e.g. property crime, prostitution) and violence among dealers, there are a number of offences associated with the different levels of the supply chain (e.g. diversion of legal precursors, bribery, corruption of border guards) that also need to be considered and are not nearly as well understood. Furthermore, countries will have different portfolios of drug-related crimes and there could be changes in criminal activities within countries over time. Several have suggested the construction of a composite indicator of drug-related crime that can be computed and compared across all jurisdictions. One approach for constructing this indicator is to place a monetary value on specific crimes and then generate the economic cost of drug-related crime for a jurisdiction. This figure could be denominated by gross domestic product (GDP) to create a measure that is comparable across jurisdictions.

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[4] This framework led us to definte drug-related crime as "Any illicit activity that is (at least partially) caused by the production, delivery, acquisition or consumption of drugs." See Chapter 5 for a detailed discussion of this framework, definition, and the related literature.

While development of a composite measure of drug-related crime may be appealing, there are at least two reasons why this approach is infeasible. First, calculating the cost of specific crimes to society and the share of offences that can be attributed to drug production, trafficking or consumption are not trivial tasks. Calculating the cost of crime is a growing field in the EU and new techniques are being generated for other countries (e.g. French *et al.*, under review). However, it is very difficult to estimate the criminal justice costs associated with drug law offences. Thus, it is expected to take a long time before Member States will be able to generate comparable cost estimates of these costs (Pacula *et al.*, 2009).

Second, it is unrealistic to think that a singular measure of drug-related crime can be consistently constructed and monitored for all Member States (MSs) for the simple reason that not all MSs define the same behaviours as crimes. Two relevant examples in the case of illicit drugs are drug possession offences (which are not criminal offences in Portugal, Spain and Italy) and prostitution. Similarly, a specific behaviour (e.g. violence) can be related to drug use or dealing or trafficking in one country, while it is not in another. MSs do not consistently define these behaviours as crimes, and hence monitoring them in a consistent fashion across countries would be extremely difficult.

Using administrative data on reported crimes or survey-based victimisation rates provides us with the possibility of estimating regression models to determine whether changes in consumption correspond with changes in crime or victimisation rates, while accounting for several other community-level factors that may also influence crime. While it is relatively easy to obtain high-frequency crime data at sub-national levels, it is much more difficult to obtain sub-national information on drug use and victimisation. Additionally, there is an endogeneity issue with respect to crime and drugs: in other words, it is not clear if an increase in drug use in a community leads to more crime or vice versa. If advanced statistical techniques are not used to address this possibility, the resulting analysis may yield biased estimates of the effect of drug use on crime. In cases like this, researchers seek alternative variables that are correlated with drug use but not crime (instrumental variables). For property crime, purity-adjusted price is a plausible instrument, but is less so for violent crime since changes in drug prices could generate violence among competing gangs. Drug laws are also used, but this assumes that proxies for expected sanction influence consumption. This may not be the case in all Member States.

In conclusion, attempts to generate comparable EU-level indicators for drug-related crime will likely have to focus on drug law offences. Knowing how the number of high-level trafficking arrests for a specific drug changes over time in a particular region can be useful for understanding changes in trafficking routes as well as the effectiveness of MSs and multinational interventions. While some countries do collect information on drug-specific trafficking offences, many do not. Another issue surrounding drug-trafficking offences is that there are noticeable differences between the EMCDDA and Eurostat estimates and the differences are inconsistent across countries. Finally, as noted in the seizure discussion above, it is difficult to interpret changes in arrests rates over time without the appropriate denominator (e.g. enforcement spending, number of police officers). That being said, if there remains pressure on the EC to collect information about drug-related crime, this seems like a logical starting point.

Figure S.1: A framework for thinking about drug-related crime
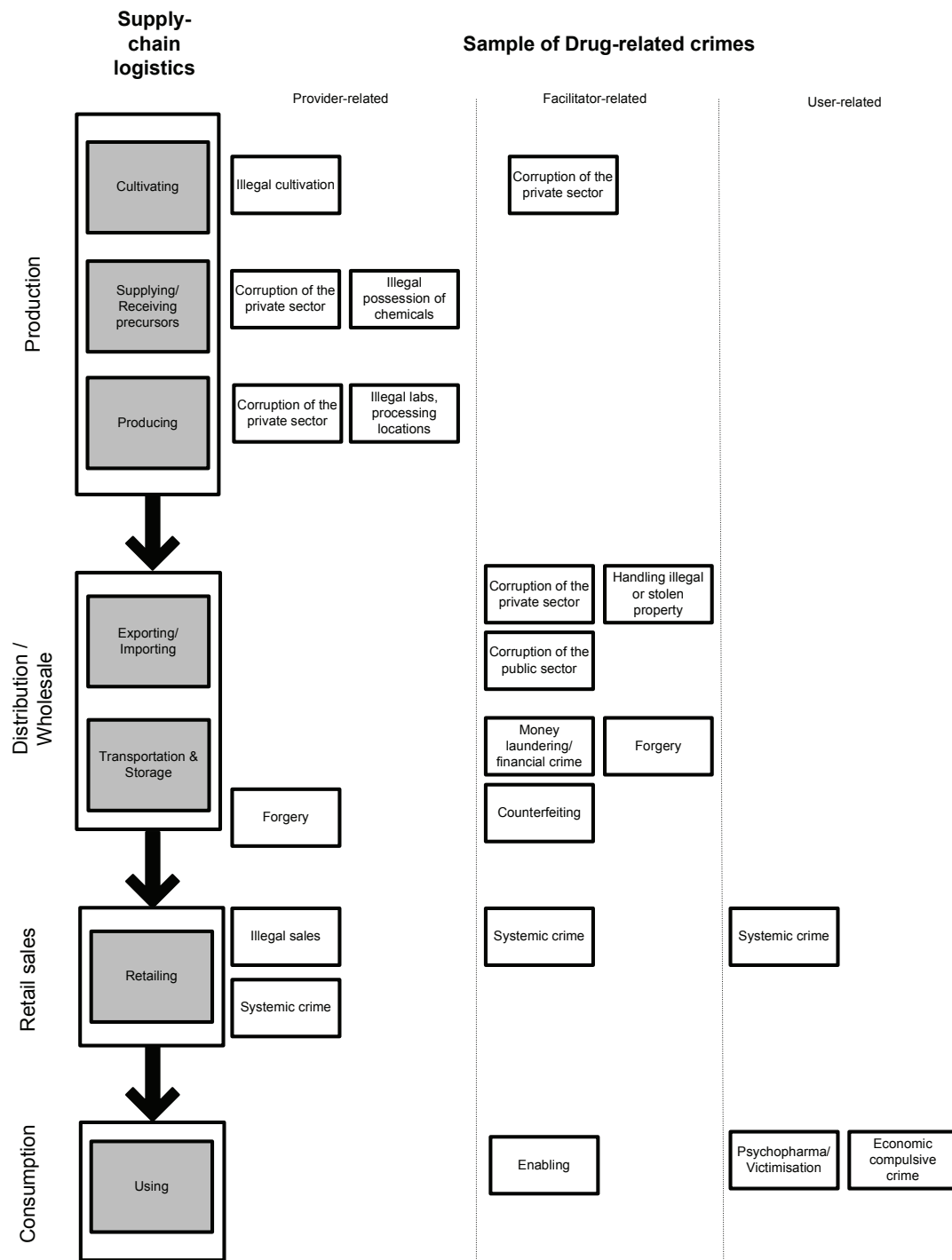
Notes: The grey boxes represent drug law offences. This is not an exhaustive list of the crimes associated with each level of the market and in many cases the crimes listed could be applied to multiple levels of the supply chain. The specific crimes will vary according to the type of drug being considered.

Recommendations

In light of these insights and to help prioritise the limited resources available for developing indicators, we offer the following recommendations to the European Commission, Member States, and other European institutions. Since some MSs are much further along in the development of data systems that can be used to generate the indicators, we present recommendations for three general time horizons from the EC's perspective: immediate-short-term, near-term, and long-term. Recommendations for the immediate short term can be implemented almost immediately and do not require large expenditures. Others will likely require more coordination and expenditure.

Immediate short-term recommendations

- Obtain and analyse existing forensic purity information for illicit substances at the national and sub-national levels. Some law enforcement agencies in MSs send all of their seizures to labs for testing while others only submit samples if requested by the prosecutor. Results from our survey of European Network of Forensic Science Institutes suggest that a majority of responding institutes have computer databases with purity information, with about half going back to the year 2000 or earlier. Given the importance of this information for understanding drug markets and supply-reduction efforts, we strongly encourage analysis of the existing data collected by these labs to inform understanding of what is available. While tabulating the number of samples available for each month and drug (preferably by sub-national unit) is a useful first step, Chapter 3 and Appendix A demonstrate that more can be learned from advanced statistical analyses that take advantage of regional and temporal variation in the data and external validity checks. This will, of course, require the cooperation of the labs; our survey results suggest that the majority of responding institutes would in fact be willing to share this information for research purposes.

- Commission the EMCDDA to streamline the data reporting requirements for Member States. It is clear from our conversations and meetings with policy experts that there is a lot of overlap in the data reporting requirements for MSs to local, national, and international organisations, especially with respect to seizures and precursor substances. If this process could be streamlined it may free up time and resources for MSs to entertain new data collection efforts. Given its infrastructure and experience in this field, the EMCDDA is well-positioned and equipped to identify these overlaps and streamline these processes. With respect to precursors, the EMCDDA should work closely with the EU Working Group on Drugs Precursors.

- Create a formal network of researchers, law enforcement officials, forensic scientists and policymakers to regularly discuss advances and challenges in evaluating supply-side enforcement strategies and creating a pan-European database with detailed information about drug seizures. For purity-adjusted prices data to advance understanding of supply-reduction and crime, they will have to be collected for an extended period of time so that trends can be detected and statistically analysed. To maintain interest in these efforts and build the relationships necessary for exchanging data, it would be useful to organise annual or bi-annual meetings that would bring together members of this network. Since the EMCDDA, as well as other European institutions, have working groups and ongoing activities related to some supply-side

issues, it will be critical to make sure that this network does not duplicate previous or existing efforts. In fact, one of the goals of this network can be to regularly identify all of the groups and activities in Europe related to collecting information about the supply side of the market to help reduce redundancies and maximize resources.

- Recommend to Member States that they decide whether they want to measure drug-related crime in their country, and if so, which crimes. To understand the true burden associated with illicit drugs, it is necessary to understand the extent to which drugs *cause* crime. There are several types of offences that can be considered when attempting to measure the level of drug-related crime in a jurisdiction. While much attention is given to offences associated with prohibition (e.g. possession and sales), those associated with generating revenue to obtain drugs (e.g. property crime, prostitution) and violence among dealers, there are a number of offences associated with the different levels of the supply chain (See Chapter 5). Bribery, document forgery, money laundering, and extortion associated with drug-trafficking are also types of drug-related crime that could be considered. The level of drug activity in a country (e.g. are they primarily a 'consumer' or 'trafficker' of illicit drugs?), will likely determine the types of crime considered and the subsequent methods required to measure this relationship. While this information may be useful for Member States, they should consider the opportunity costs associated with developing these attribution factors. This is not an easy task and it may be better to focus analytic resources and data system development on other indicators.

Near-term recommendations

- Combine forensic lab and police case info in a way that allows operational analysis (by police) and strategic analysis (by police and policy analysts). Some law enforcement agencies do not keep detailed information about the circumstances of individual seizures in a computer database – including purity information. Since many labs already maintain databases of all samples analysed, it might be possible to build these databases to retain more useful information about seizures for analytic purposes. For example, law enforcement agencies could be asked to submit a simple information sheet pertaining to the circumstances of the seizure (e.g. date, location, time of day, weight, method of detection, type of container, etc.). While law enforcement agencies may be limited with respect to the information that they can actually share with the labs, basic information, such as the total weight and location of seizures, would be useful. This effort would likely require a formal agreement between the law enforcement agencies and the labs, especially with respect to which institution(s) would be able to access these data and use them for analytic purposes. Finally, the labs would need to be compensated for collecting and distributing these data.

- Record and analyse information about undercover drug purchases in countries where this occurs. One approach to generating purity-adjusted prices is to use the transaction-level information obtained about the price, weight and purity of drugs found in, and the circumstances of, undercover drug busts. 'Buy and busts' occur in a number of European countries (Fijnaut, 1993; Nadelmann, 1993; 1995; Veen, 1999) and it would be useful to use this information (possibly along with information about the purity of seizures) and apply RAND's methodology for generating price series (Caulkins *et al.*, 2004; IDA, 2008). The time and resources required for this effort

depend on how much of this information is currently available in electronic format. This could be very time- and resource-intensive if it requires creating a database from hard copies of investigation files. The United States' Drug Enforcement Agency's Domestic Monitoring Programme (DMP) operates in almost 30 cities and, throughout the year, involves law enforcement agents and their informants seeing how much heroin they can purchase and of what quality for $100. Law enforcement or their informants make the purchase and then submit the entire package to the lab – there is no investigation of the seller and no strategic plan in terms of infiltrating a drug network. Given that it is not related to any strategic law enforcement activities, the purchases can be thought of as more random than the typical entry in a seizure database (although still not representative). From the perspective of data collection, we encourage other jurisdictions to at least consider this approach when deciding the best way to generate information about purity-adjusted prices. This approach could also be improved with the development of a strong sampling frame and/or weighting schemes to help generate samples that are more representative of typical transactions.

- <u>Request Member States to report information about seizures to the EMCDDA by 'weight bins'</u>. An important point made in this report is that information about the total number of seizures and the total grams seized is of limited value for understanding changes in drug markets and supply-side interventions. At a minimum, it would be useful to also include information about the median weight seized. This would make it possible to determine whether a few large seizures were having a large effect on the statistics. It would be preferable if information about the total number, total weight, median weight (and purity if possible) was reported for transactions at different levels of the market. The 'weight bins' (e.g. less than or equal to 1 gram, between 1 and 10 grams, between 10 and 200 grams, more than 200 grams) that generally capture the retail, mid-level retail and wholesale transactions will likely differ by country and substance. But reporting information for these bins will allow law enforcement officials to learn more about whether certain activities are influencing the distribution in typical trades made in the market. At the aggregate level, it is more difficult to detect changes in the size of transactions over time.

- <u>Collect systematic data about what happens after someone is arrested for a drug offence or commits a drug violation while on probation</u>. While arrests for drug possession and sales are important for assessing the costs associated with drug-related crime, this is only one aspect of the costs. The costs generated after arrest, such as adjudication or incarceration, should also be included if one wants to better understand the costs associated with these types of crimes. Additionally, this information is also important for understanding the expected sanction associated with these types of offences. While studies about the general deterrent effect of expected sanctions for drug offences are notoriously mixed, there is emerging evidence that swift, certain and small sanctions for probationers who test positive for drugs or miss appointments can have a strong specific deterrent threat. For analyses of different legal regimes or probation practices, it is important to focus on the probabilities of detection and punishment as well as the type of sanction typically imposed. Even in countries with good data systems, information about what happens after a drug violation is hard to obtain. Thus, this task will likely pose a special challenge for those

countries with less developed data systems. While part of this is simply a resource issue, there may also be local barriers with respect to tracking arrestees and probationers through the system that will have to be considered.[5]

Long-term recommendations

- Regularly collect information about drug prices and other topics from heavy drug users. To create a prices-series based on the methodology discussed in the Appendix, MSs will a need to collect low-frequency price information. This information could be obtained in a variety of ways, including surveys with arrestees, treatment participants, or a convenience sample of heavy drug users. Since drug law-enforcement activities are often temporarily effective at best, it can be difficult to study these disruptions if price information is only collected on an annual basis. Annual information collection is a useful first step, but it would be preferable if this information were to be collected on a quarterly basis. Inquiring with users about the price paid at last transaction as well as other information about the transaction (e.g. "Did you purchase from your regular dealer?") and the market (e.g. "Did you ever try to buy heroin in the past month and were you unsuccessful? If so, why?") would be very useful. It is also important to note that these surveys can be used to obtain information about a variety of topics (e.g. crime, health, welfare) and can be developed to have rotating modules where some questions can be asked every quarter, some can be asked annually, and others can be asked only once.

- Collect information about typical quantity consumed by type of drug user. One of the major impediments to understanding the size of drug markets is the dearth of information about the typical quantities consumed on a use day. Earlier reviews of the quantity-consumed literature will serve as a useful starting point for researchers interested in this question; however, considerable work needs to be done in this area. While useful information about cannabis consumption can be obtained from records in general population and school-based surveys, in most countries insightful information about harder drugs will need to be obtained from other populations. If Member States are interested in learning more about the use patterns and drug market activities of heavy drug users who account for most consumption in mature markets, they should consider adding new questions and possibly new populations to their survey portfolios. As noted above, in some jurisdictions it makes sense to target arrestees, while in others it may make more sense to focus on those entering treatment or convenience samples of heavy users. Obtaining information about typical grams consumed on a use day by frequency of use (e.g. past month, past year) would be a valuable contribution; and focusing on other subgroups would be even better (e.g. by age, gender, race/ethnicity).

- At the EU level, standardise definitions of drug-trafficking offences then involve MSs in tracking these offences for specific drugs. The EMCDDA collects arrest information from the National Focal Points by type of drug and type of offence (i.e. possession and

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[5] As this report goes to press, the EMCDDA is about to release a Selected Issue on sanctions for drug offences. This will be a useful contribution to the field and it should make it easier for analysts to understand what happens after someone is convicted of a drug arrest.

sales), but not jointly. Thus, the Statistical Bulletin cannot be used, for example, to track how cocaine trafficking arrests have changed over time. Making international comparisons is also difficult since MSs report different types of trafficking information to the EMCDDA (e.g. arrests, convictions). Making intranational comparisons is also complicated by the fact that MSs report different information about the number of trafficking offences to the EMCDDA and Eurostat. There are large differences between these estimates and they are not consistent across countries. It will take significant resources and efforts to agree on common definitions and incorporate them into practice. Fortunately, there is a lot of discussion in Europe about harmonising criminal justice data systems (e.g. DG JLS), not just related to drugs. As these data collection efforts advance, it will be critical to make sure they include fields for specific drugs and specific offences. Additionally, these new data systems should include fields which allow law enforcement officers to estimate the weight of the drugs obtained (similar to that which is being done in the US with the new National Incidence Based Reporting System).

- Create a pan-European database with detailed information about specific seizures in Europe. The creation of such a database could improve understanding of trans-European drug flows and their response to Member States' and coordinated policy initiatives. While it would be ideal to capture information about every seizure, a programme such as the UK's Project ENDORSE is probably more realistic. This programme focuses on collecting detailed information on all seizures over 25 grams. This would be a long-term project as it would require MSs to create these databases, coordinate interoperability, have an international organisation to link them and regulate who would have access to this information. The first iteration could simply include the information that is currently collected by many of the forensic labs. Combining this with the seizure-level information that is reported to the UNODC by some MSs could be informative (see Table 4.2 for more information on these countries' reporting). If law enforcement agencies decide to share more information about the seizures with the lab, this information could also be added to the database. This recommendation is closely related to the harmonisation recommendations made in 2001 by the Council of the European Union (2001). Among other things, the Council recommendations suggested that these elements should be collected for all seizures: date of seizure; place of seizure; type of drug; appearance; amount; price; and purity. The recommendations were intended to be a guidance document and during our Policy Expert meeting in July 2009 questions were raised about why they were not implemented in most Member States. Understanding the barriers to implementing these 2001 recommendations will need to occur before there can be a serious discussion of creating a pan-European database.[6] Thus, we consider this a long-term recommendation.

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[6] A good place to start is the UK Home Office's Review of Drug Seizure and Offender Statistics which was published in 2004 (Home Office 2004). See Chapter 4 for additional details.

Closing thoughts

During our meeting of policy experts, some law enforcement officials noted that while it would be 'nice-to-know' about many of the indicators and data systems, they wanted to make sure the focus was on the information that they 'need-to-know'. This is a valid point as it speaks to the importance of acknowledging time and resource constraints as well as the fact that it may not be obvious to those who are burdened with new data collection and reporting tasks how this information is relevant to their department or agency. We have three responses.

First of all, none of our immediate-term recommendations involve law enforcement agencies, except for those officials who would attend our recommended group about the advances and challenges in developing supply-side indicators. We realise that many law enforcement agencies are already burdened with data collection and reporting requirements from local, national and international agencies and we hope the EMCDDA can help streamline these efforts in the future.

Second, forensic and statistical analyses of purity data can provide additional intelligence for ongoing investigations. While the purity information is important for creating indicators and helping prosecutors learn whether the substance was indeed illegal, forensic analysis can also be used to learn whether certain seizures are related (e.g. come from the same source, use the same type and ratio of cutting agents). An example of such an analysis project is the Collaborative Harmonised Amphetamine INitiative (CHAIN), which was terminated in 2008, and should have established a sustainable European amphetamine system. Currently, the Member States, Commission and Europol are examining the establishment of an EU-wide system for the forensic profiling in relation to drugs law enforcement of synthetic drugs and other drugs.[7] Indeed, similar analyses can be conducted on the containers and packages in which the drugs are shipped. The UK's Project ENDORSE is a good example of a comprehensive system for multiple substances (not just amphetamines), but many MSs and local jurisdictions may not have the resources to develop such a programme. As an alternative, agencies could submit readily available information to the labs when sending the samples and then this information could be entered into a computer by the lab (e.g. total size of the seizure, number of packages, nationality of the trafficker, location of the seizure, etc). The resulting database could be very useful for understanding patterns and making connections between cases. Indeed, some MSs already report this seizure-level information to the UN, but it does not include the forensic analysis.

Finally, the goal for creating these indicators and collecting additional information is to improve our understanding of markets and different supply-reduction efforts. The work that has been done by the EMCDDA and others to develop consistent demand-side indicators has made it easier to understand trends, make useful comparisons, and target scarce prevention and treatment resources. However, these efforts have taken several years and it would be surprising if it did not take as long to develop indicators of similar quality and consistency on the supply side – especially when considering the existing variation in MSs data systems. This does not mean that we cannot immediately improve our

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[7] This objective is reflected in Action 30 of the EU Drugs Action Plan (2009-2012).

understanding of drug markets and supply-reduction; rather, it suggests that there is information to be learned in both the short and long run. It will likely take many years before enough information is collected to be able to generate many of the insights that law enforcement agencies and policymakers 'need-to-know' about drug markets, supply-reduction, and drug-related crime in the EU.

Introduction

Stijn Hoorens and Beau Kilmer

Illicit drug use continues to be an important public health issue in Europe. More than 1.5 million Europeans had used cocaine in the previous month, when surveyed, and there are about as many problematic opioid users in the EU (EMCDDA 2008). Furthermore, production, trafficking, dealing and using illicit substances is thought to be associated with other illegal activities and criminal behaviour.

The drug situation in the EU is elaborately explained in the European Monitoring Centre for Drugs and Drug Addiction's report (EMCDDA 2008). Although the prevalence of drug use has always varied between different Member States, new problems have emerged in some areas, and there are no data to suggest a significant fall in drug use (*ibid*; Reuter *et al.,* 2009). While the consequences of illicit drug markets are experienced primarily at local and national level, the EU argues in its European Drugs Strategy that it is a global issue that needs to be addressed in a transnational context (Council of the European Union 2009). Therefore the aim of the EU Drugs Strategy is to add value to national strategies while respecting the principles of subsidiarity and proportionality set out in the Treaties. The Strategy concentrates on two policy fields, demand reduction and supply reduction, and on two cross-cutting themes: international cooperation; and research, information and evaluation (*ibid*).

Consequently, considerable effort has been made to collect useful information about the demand and supply of illegal drugs at the international, national and sub-national levels in Europe. In particular, the efforts by the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) have been pivotal in serving its purpose to provide accurate and standardised information about different issues related to drugs that are relevant to policymakers at both European and Member State level. This information can be used to learn more about the effectiveness of the plethora of policies and programmes intended to reduce drug supply, its use and related harms throughout Europe.

However, efforts to provide insight into the different aspects of Europe's illicit drug problems have largely focused on indicators developed to assess demand-side strategies. That is, strategies aimed at reducing the consumption of and harms related to illicit drugs. Indicators to assess the extent of the effectiveness of demand-side strategies include: problem drug use, demand for treatment, drug-related deaths and mortality, and drug-related infectious diseases. The concepts, mechanisms and causal relations on the supply side are considerably harder to define and thus measure. For this reason, despite pioneering work by the EMCDDA, other European organisations, and Member States, the

development of measures capturing dimensions of the supply of different illicit substances is still an emerging field in the EU.[8] Although various law enforcement agencies frequently report information on seizures, arrests and, occasionally, price, current data-collection efforts are not sufficient to support careful analyses of these markets in a manner that would enable one to understand the effect of specific supply-side strategies. This document aims to provide a significant contribution to this emerging field.

To advance the efforts mentioned above, the European Commission DG Justice, Freedom and Security commissioned RAND Europe to recommend indicators for improving the understanding of illicit drug markets, supply-reduction efforts and drug-related crime in the EU.[9] This document is the result of this effort. Its specific aims are:

1. to provide an overview of existing data collection initiatives at EU level and at the level of Member States for the assessment of the illicit drug market, drug supply-reduction efforts and drug-related crime

2. to assist the Commission in determining relevant policy needs for statistics and information at EU level, and to ascertain to what extent these needs are feasible and/or covered by existing data collections

3. to assist the Commission in making the term 'drug-related crime' operational through a number of indicators and related data collections.

In order to address the challenges laid out above, we have divided this report into six chapters. In Chapter 3, we introduce the broad concepts and an economic framework for thinking about the market for drugs. Using economic theory, we treat illicit substances like any other market good with prices, supply and demand. Based on this framework, we conclude that priority should be given to systematically collecting information about purity-adjusted prices. The following two chapters contain more detailed elaboration of potential indicators, information sources and data collection mechanisms. We distinguish between indicators for understanding supply-reduction efforts (Chapter 4) and indicators for understanding drug-related crime (Chapter 5). In these chapters, we introduce a conceptual framework for understanding drug markets and the criminal behaviour associated with these markets. This framework helps to identify indicators to measure the effectiveness of supply-reduction policy measures and drug-related crime. Chapter 6 presents the findings from three case studies. We discuss insights from our document research and interviews with those involved in data collection efforts in the United Kingdom, Czech Republic and Spain.

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[8] The EMCDDA is also in the process of collecting wholesale price information. This will be an important contribution to this field.

[9] EU Drugs Action Plan for 2009–2012, Action 67: To develop key indicators for the collection of policy-relevant data on drug-related crime, illegal cultivation, drug markets, and supply-reduction interventions and to develop a strategy to collect them.

CHAPTER 3   **A framework for thinking about drug markets**

Rosalie Liccardo Pacula, Beau Kilmer and Priscillia Hunt

3.1   Introduction

The goals of this chapter are to present an economic framework for thinking about illicit drug markets and discuss indicators for understanding changes in these markets. There are two major insights that come from this chapter: 1) Collecting information about purity-adjusted prices is critical for understanding drug markets and the efficacy of specific law enforcement activities, and 2) There are at least two approaches that could be used to improve the collection of purity-adjusted price information in Europe.

With respect to the first insight, it is important to distinguish between two types of prices: raw prices and purity-adjusted prices. If someone purchases a 1-gram bag of heroin on the street for €75, the raw-price per gram is €75. However, we know that heroin purchased at the retail level is often diluted by dealers trying to expand their profit margin and dealers usually do not know the precise purity of what they are selling. Thus, it would not be unusual if a gram of heroin purchased for €75 in one part of the city was 20 percent pure and in another place it was 30 percent pure. In this example, the purity-adjusted prices would be €375 per pure gram of heroin (€75/0.2) and €250 per pure gram of heroin (€75/0.3), respectively. This chapter demonstrates how we can learn more about markets from purity-adjusted prices than from only having information about raw prices.

With respect to the second insight about generating estimates of purity-adjusted prices, we focus on two possible methodologies and discuss what can be learned from each, namely:

- transaction-level data from undercover drug purchases
- a new method, pioneered by Caulkins and colleagues, that combines high-frequency forensic purity data with low-frequency raw-price information.

The first methodology is discussed in detail in this chapter; the second is provided in greater detail in Appendix A, but the key points that can be learned from each and how they can be used to improve policy are discussed here.

3.2 Background: an economic framework for thinking about the market for drugs.

Illicit drugs are ultimately consumer goods and, like other goods in modern societies, they are provided primarily through markets. As such, drug prices, which are determined by the quantity of a drug available (specified through a supply curve) and the quantity consumers want to purchase (specified by a demand curve), play a prominent role in understanding, analysing, and intervening in these markets. Importantly however, drugs are sold in hidden (illegal) markets so information about the quality and/or precise quantity of the product being sold and the price other suppliers are charging for the same product is neither advertised nor readily available. This complicates matters, as without this information the 'law of one price' will not hold in these markets. Instead, most retail drug markets are characterised by a range of prices for a particular amount of a drug (e.g. one tenth of a gram of heroin) rather than a single price (Caulkins and Reuter, 1998; Arkes *et al.*, 2004). Nonetheless, the range (or more correctly 'distribution') of prices observed in any particular market at a point in time does in fact move in systematic ways over time (Caulkins *et al.*, 2004; Reuter and Caulkins, 2004; Arkes *et al.*, 2008) and in a manner that is consistent with how simple economic theory would predict given the changes in supply and demand (Weatherburn *et al.*, 2003; Caulkins *et al.*, 2004; Arkes *et al.*, 2008; Dobkins and Nicosia, 2009). Thus, in an effort to provide a general understanding of how drug policy might affect the supply and demand of drugs, and hence drug prices, we need to start with a simple framework for thinking about both the supply and demand for drugs.

The supply of drugs. The cost of supplying any good, whether legal or illegal, can be broken down into two components: (a) the cost of actually producing and transporting the good and (b) 'normal' profits. Normal profits are the return that owners of capital (or investors who provide the capital) receive for using their resources in the production/transportation of that particular good. In illegal markets, 'normal' profits are more accurately thought of as 'expected' profits, as dealers who participate in these markets take their chances of getting caught (either arrested or having their goods confiscated) so the profits associated with the sale of a given amount of product are uncertain (Reuter and Kleiman, 1986). While some dealers may earn high returns if their product goes undetected, other dealers either lose everything by being arrested or lose some profits due to product being confiscated; so the expected profits reflect the average return across all dealers participating in this uncertain market.

In the case of a perfectly competitive market, economic theory predicts that normal profits go to zero because there is free entry and exit into the market. Any market receiving a positive gain in terms of normal profits will be swamped with new suppliers; and the new entrants to the market will then increase the amount being supplied to the market to the point that price must fall to get consumers to buy the extra product. Price will continue to fall until profits fall to zero, and there is no longer an incentive to leave or enter the market.

While retail drug markets are generally understood to be competitive, there are good reasons to believe that the supply does not operate in a manner consistent with perfectly competitive markets. In particular, there appear to be significant barriers to entry and exit (e.g. risks associated with bringing a drug to market or leaving a criminal organisation) and

lack of perfect information (e.g. specialised information on connections that are useful for keeping a drug undetected or on wholesale sources for obtaining drugs) in some drug markets. These factors make it difficult for new suppliers to enter the market when unusual profits exist, although for certain drugs it may be less of an issue (e.g. cannabis markets). Hence, this is a market where 'normal' profits, or more accurately 'expected profits', could be positive for some.

Most economists describe the additional return over 'normal profit' in black markets as the return to producers/sellers for engaging in a risky business, or incurring legal risks in order to bring their good to the market. These legal risks, therefore, can be thought of as just an additional cost of production, and the extra cost that producers/sellers incur to remain undetected by law enforcement is often referred to as an 'enforcement tax' (Reuter and Kleiman, 1986; Mejia and Posada, 2008). Because legal risks reflect the risk (or probability) of getting caught (actual enforcement) as well as the expected penalty imposed if they are caught (expected sanction), the necessary return for incurring legal risks in bringing the drug to market may go up even if drugs are not physically seized. Higher expected sanctions raise the legal risk even when the rate of seizures remains the same. Any factor raising legal risk (expected sanction or chances of detection) lead to an increase in the cost of production due to this component.

In markets characterised by multiple sellers, a supply curve can be used to represent the cost of bringing different quantities of the drug to market (as shown in Figure 3.1).[10] Implicit in the construction of an upward sloping supply curve is the assumption that producers can only bring more drugs to the market (total drugs supplied) by paying more for each unit of input used in the production of that good. In other words, there is scarcity in the inputs necessary for the production and/or delivery of drugs to markets (land, labour, chemists, safe distribution routes, and so on) that make it difficult to increase total output without having to pay more for the units of production that produce that output. In the case of illegal drugs, one can think of a number of plausible reasons why this assumption might be reasonable. For example, available land for growing coca or poppies undetected is indeed likely to be scarce and, because large plots are more easily detected than small plots, economies of scale typical in agricultural products cannot be achieved. Similarly, because in most countries the sanctions associated with getting caught are tied to the amount of product being shipped, there are greater legal risks associated with transporting larger quantities of product to markets.

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[10] Empirical evidence supports the notion that sales of drugs at the retail market level and the farm-gate level are indeed consistent with the notion of multiple sellers and/or producers. Cartels are more actively involved in the processing, shipment and trafficking of drugs, where more specialised skills are required. Even in retail markets where gangs own part of the market, there can be competition from rival gangs or new products.

Figure 3.1: An increase in the demand for heroin can lead to a price increase in the short run
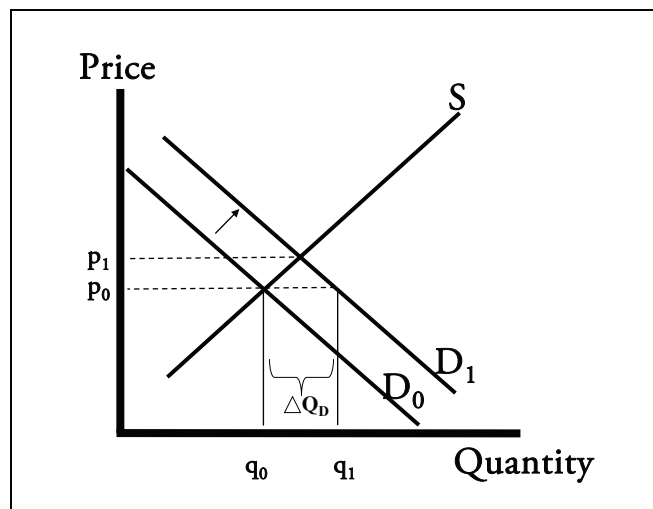
The supply curve represented in Figure 3.1 clearly over-simplifies the drug market, as drugs are not homogenous commodities. Although typically sold in standardised packages on the retail level, these goods are commonly differentiated by the purity of the drug exchanged not unlike how wine is differentiated by the quality of the grapes in particular growing regions (Caulkins 2007, 1994; Caulkins and Reuter, 1998). Furthermore, the actual purity of the product being sold by the final retail seller may not be known with perfect certainty. Nonetheless, sellers (as well as buyers) within these markets form expectations of the purity of the product they are selling based on information they have (the source of the product, purity of similar packages, relationship with the wholesaler) and operate similarly as those with perfect knowledge.

The demand for drugs. The demand for a typical good sold in standard markets represents the price that people are willing to pay to get a specific quantity of that good. The market demand curve, therefore, represents the combined quantities that everyone who is willing to buy at a given price would want to consume. Generally, when prices are too high most people are not willing to pay for a good, although a few are, and the quantity demanded in the market is generally low. However, as the price of a good drops, more people are willing to buy the good and those who were already buying may want to buy more, hence the quantity demanded for the good goes up (because more people choose to purchase the good due to its lower price). Thus, the market demand curve for normal goods is downward sloping.

Although drugs are prohibited and can be addictive, there is clear evidence from several developed countries that drug initiation, use, and the negative consequences associated with use, are inversely related to price, indicating that even illegal drugs follow the simple law of demand as economic theory would suggest (Bretteville-Jensen and Sutton, 1996; Grossman and Chaloupka, 1998; Saffer and Chaloupka, 1999; Darke *et al.*, 1999; Pacula *et al.*, 2001; DeSimone and Farrelly, 2003; Smithson *et al.*, 2004; Williams *et al.*, 2004; Van Ours, 2006). When prices rise, use declines, even among hardcore populations predominantly represented among emergency department cases (Hyatt and Rhodes, 1992, 1995; Caulkins, 2001; Dave, 2006), criminally-involved users (Hyatt and Rhodes, 1995;

Caulkins, 1995), and other hardcore populations (Silverman and Spruill, 1977; Bretteville-Jensen and Sutton, 1996).

Equilibrium prices. The equilibrium monetary price of a good is given by the intersection of quantity demanded and quantity supplied. As was mentioned previously, however, imperfect information and the hidden nature of drug markets create conditions where a single price for a particular good (e.g. one pure gram of cocaine) will not be the same across all sellers operating in the same local market. Like retail gasoline, even within a small geographical area a distribution of prices will be observed for the same basic drug. The distribution can be characterized by a few basic characteristics, such as the minimum price, the maximum price, the median price and the average price. And to the extent that the distribution remains fairly stable in terms of its spread, then movements in the average price or maximum price will convey information regarding how prices are generally moving in that market. In other words, the average price paid in a given drug market will change in response to changes in either the supply of that drug (in terms of the total quantity of the drug available on the market) or the demand for that drug (in terms of the total quantity of the drug consumed).

Since there are minimal data on the cost of transporting, distributing and selling drugs in consumer countries,[11] information on the average price paid for a drug combined with information on how much is consumed in that market (i.e., demand) can provide insights into what is happening with supply of the drug in that market and the extent to which enforcement strategies are effective at influencing the price of drugs. For example, if there is a sudden increase in demand for heroin, there would be a shift out of the demand curve (see Figure 3.1). At the original price in the market (p^0), the amount suppliers are willing to supply at the price (q^0) is significantly less than the quantity everyone now in the market wants to consume at that price (q^1). The result is a shortage of heroin in the market. In response to the shortage, savvy heroin dealers will start raising their prices (causing the average price people have to pay in the market to increase), since some people would be willing to pay more to get the drug. As prices increase, some individuals in the market will no longer be willing to buy as much heroin, and the quantity demanded starts to decline (movement along D1 curve to the left as price raises). The market equalises once again when quantity supplied is equal to quantity demanded at the new intersection point (p^1, with a quantity given by a value between q^0 and q^1). Here p^1 represents the average price reflected in the market based on the distribution of prices offered by sellers of the existing stock of heroin.

It is possible, however, that the higher prices that sellers are getting for their limited heroin will cause producers to plant more opium or produce more heroin, to better meet the rise in market demand. If that occurs, there would be a shift out of the supply curve as well, indicated in Figure 3.2. Depending on how much more suppliers produce, the equilibrium level of prices may be higher, lower or the same.[12] Also, if the consumers are fairly

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[11] Detailed cost information about cultivation, production and wholesale prices is available for some source countries (e.g. Colombia; Mejía and Posada, 2008).

[12] Depends on the elasticities of demand and supply as well as how large the shifts are in each curve.

insensitive to changes in the price of heroin, then a supply-side intervention that slightly influences the market price will not have a large effect on the quantity consumed.

Figure 3.2: An increase in the demand for and supply of heroin
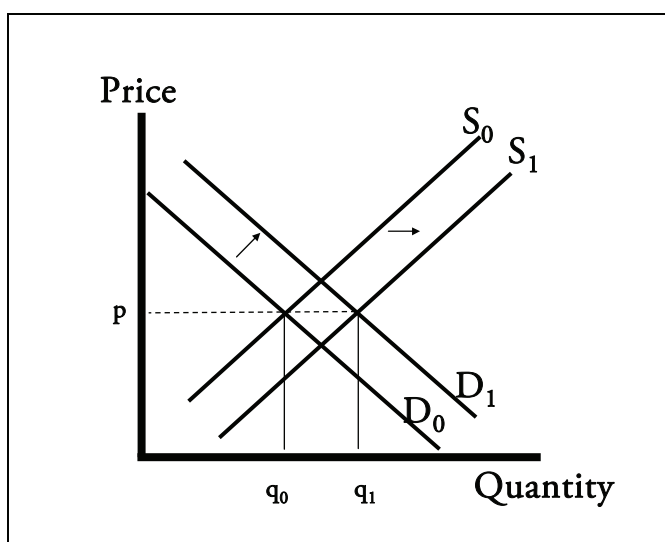
It is now possible to see how careful analysts can use information on the demand for a drug in the market and the average price paid to infer information about supply. If an analyst has knowledge of demand, and demand increases unexpectedly or quickly, then we should expect to see prices rise in the short run. The only way average price would not increase is if supply increased to meet the extra demand. Additionally, if the average price falls, then it must be because supply exceeded demand, everything else held constant. The amount of time needed for these changes to take place is not entirely known. A response to an initial shortage could be both an increase in prices for a while, and then a moderate decline as additional supply is brought into the market. So, full use of this model from an analytic standpoint requires useful knowledge of the growing or producing process (in terms of amount of time necessary to produce or grow), the ability to store product and the average shelf-life of that product. Knowledge of all those factors can better inform the analyst about how quickly one might expect price to adjust to demand and supply shifts.

3.3   Indicators and policy-relevant data for understanding drug markets

This section focuses on indicators that provide insight into drug markets and discusses the data necessary to create these indicators. In the case of purity, it serves two roles. It is an important indicator by itself, but it can also be used to create a key indicator for understanding what is happening in illicit drug markets: purity-adjusted price. There are other important indicators that provide more information especially about the supply side of the market and these are discussed in Chapter 4. With respect to demand, considerable progress has been made by the EMCDDA to improve and harmonise data on prevalence and problematic drug use. In addition to obtaining information about problematic drug use for specific drugs (which is extremely difficult to do in some countries), we make a specific request in this chapter to improve understanding about the typical quantities

consumed of illicit drugs by type of user. Without this information it is difficult to understand the total amount of substance that is actually consumed in a particular market.

3.3.1 Purity

It is common for illicit drugs to have impurities, and many have very low purity levels at the retail level.[13] Purity levels, however, do tend to fluctuate and an understanding of these fluctuations can provide information about what is happening in the market. In one of the first careful examinations of cocaine purity data, Caulkins (1994) showed that there were distinct distribution levels in the market for drugs characterised by differences in average purity and average quantity traded. The average purity of a drug traded at the wholesale distribution level is typically higher than the average purity of a drug traded at the retail level (e.g. a street dealer selling to an individual user).

The fact that some drugs get diluted as they move down the distribution chain also has important implications for understanding how law enforcement might impact these markets (Caulkins, 1997a). If the purity of drugs at the wholesale level does not vary much over time, but the purity at the retail level does, it may be due to the effects of law enforcement effectively disrupting this part of the distribution chain (so retail sellers have to make their existing stock of drugs go further). A particularly salient example of this comes from the 2000–2001 heroin drought in Australia. Researchers have shown that the average purity of retail heroin available in Victoria in 2000 was 46 percent, while the average purity of retail heroin in 2001 was 10 percent. While the average purity rebounded as the quantity of heroin available increased, once the drought was over, this is striking evidence that supply shocks (possibly caused by effective law enforcement) can indeed be observed by changes in purity. The key to observing such patterns, however, is the availability of high frequency data (in terms of the number of observations over short periods of time – such as a month).

The EMCDDA collects drug specific purity information from Member States and reports summary information by country and year (min, max, mean, mode and sample size). They note, however, that in some cases the data was submitted from local rather than national monitoring systems and from ad-hoc, non-repeated studies. The information is reported to be for the retail level, although it is not clear whether the reporting agencies are reporting purities for the same weight. Further, the type of information systems (police sources, surveys among drug users, etc) and the sampling strategies used to produce data on the purity of illicit drugs at retail level do vary considerably across countries (Table 3.1).

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[13] As noted by Caulkins *et al.,* in the Appendix to this report, there are some drugs that are not usually diluted including 'marijuana, some diverted pharmaceutical pills, and perhaps meth where it is sold only as 'ice'.

Table 3.1: Purity-data collection systems, by European country

Country	Organisations	Sampling frame
Belgium	IPH, EWS monitoring	Substances seized by police services and customs and reported through the Early Warning System
Bulgaria	Forensic Science Institute – Ministry of the Interior (FSI-MI); National Research Institute of Criminology	Samples of drugs seized by the police and the local regional institutions from traffic and on street market were analysed
Czech Republic	Regional analytical departments of the Police, General Directorate Customs and Institute of Criminalistics of Prague	Samples of drugs seized
Denmark	Street Level Project (Institute of Forensic Medicine, University of Aarhus)	Small seizures collected on a random sampling basis by five police districts in Denmark (Copenhagen, Aarhus, Odense, Aalborg and Esbjerg) and sent to institutes of forensic chemistry to perform analysis
Germany	Forensic Science Institute of the Federal Office of Criminal Investigation (Kriminaltechnisches Institut des BKA)	Samples of drugs seized
Estonia	Forensic Service Centre	Samples from seizures sent by Police Board
Ireland		Samples from seizures sent by Garda Síochána
Greece	State General Chemical Laboratory (Third Chemical Service of Athens and Second Chemical Service of Thessaloniki)	Samples of drugs seized by the Hellenic Police, Customs, the Coast Guard and the Special Controls Service
Spain	Drugs National Central Office, Ministry of Interior	Samples of drugs seized
France	SINTES (National Identification System for Toxins and other Substances)	Analysis of drugs seized by repressive bodies (police, gendarmerie, customs) and drugs collected through social services (health, etc)
	TREND Observatory	Gathers information from users (active users-by going to squats and the streets and at parties – by going to clubs, festivals, open parties, etc) and from people working in prevention, care or repression
	Laboratoire de la Police Scientifique de Lyon	All seizures / monitoring system
	Laboratoire interrégional des Douanes de Paris	All seizures / monitoring system
Italy	Anti-drug Central Service Division (DCSA) of the Ministry of Interior	Samples of drugs seized
Cyprus	State Laboratory (only for Ecstasy)	Drugs seized by the Police
Latvia	State Forensic Research Department	On all seizures where a person is involved in the case (this excludes seizures through the post without a known sender or receiver)
Lithuania	Drug Control Department; Forensic Service, Criminal Police Bureau	Seized amounts of drugs and psychotropic substances
Luxembourg	Specialised Drug Department of the Judicial Police / Laboratoire National de Santé, Division Toxicologie (RELIS)	Samples of illicit drugs seized

Country	Organisations	Sampling frame
Hungary	Institute for Forensic Sciences (BSzKI)	Samples of illicit drugs seized
	Criminal Professional and Research Institute	All seizures submitted for analysis of over 15 g / resin seizures of over 5 g / routine analysis of seizures
Malta	Forensic Science Laboratory Data	Analyses seizures from Malta Drug Squad
Netherlands	Drug Information and Monitoring System (DIMS) of the Trimbos Institute	Submitted by consumers at test locations of drug treatment services; samples confiscated by the security staff at clubs
	Trimbos Institute 'THC-Monitor'	Samples of different cannabis products (about 1 gram each) are regularly procured from a random sample of 50 coffee shops and chemically analysed
Austria	Federal ministry of the Interior/Federal Criminal Agency (BMI/Bundeskriminalamt), representation by Gesundheit Österreich GmbH/Austrian Health Institute (GÖG/ÖBIG)	Samples of drugs seized under a specific threshold or when suspicious about the substance /Undercover purchases by police agents
	ChEckiT! Project	Bought and tested substances from music events
Poland	Central Forensic Laboratory	Samples seized by the police
Portugal	Criminal Police Scientific Laboratory – Toxicology	Random selected sample of seizures of under 1g / routine analysis of seizures
Romania	Central Drugs Analyses Laboratory	Seizures by the Anti-drug Directorate within the National Police
Slovenia	Forensic Laboratory at the Ministry of the Interior	Sample of seizures at the national level
Slovakia	Forensic Expertise Institute (FEI) of the Police Force Presidium in Bratislava (KEÚ PZ) and its laboratories in Banská Bystrica and Košice	Samples of illicit drugs seized
Finland	National Bureau of Investigation Crime Laboratory	All seizures / monitoring system
Sweden	National Laboratory of Forensic Science	All cases for which a sufficient amount of drug is supplied
UK	Forensic Science Service Ltd (FSS)	Samples of drugs seized by Police and HM Revenue and Customs
Croatia	The Forensic Centre (Ivan Vučetić) at the Ministry of Interior	All cases for which a sufficient amount of drug or psychotropic substance is supplied
	Ecstasy Project – (Institutes of Forensic Chemistry)	Samples of ecstasy pills seized and sent by the police districts and sent to one of three institutes of forensic chemistry to perform analysis
Norway	National Crime Investigation Service (Kripos)	Tests seized drugs over a specific amount (e.g. over 1kg of heroin)
Turkey	Police and Gendarmerie Criminal Laboratories and the Council of Forensic Medicine Institution	Samples of illicit drugs seized

Sources: Authors' extraction from each country's EMCDDA National Reports (2007)

To learn more about the availability of purity information in Europe we created a brief survey that was distributed to members of the European Network of Forensic Science Institutes (ENSFI). As of September 2009, the ENSFI had 56 members in 32 countries (all EU and most candidate countries) and it 'has been established with the purpose of sharing knowledge, exchanging experiences and coming to mutual agreements in the field of forensic science' (http://www.enfsi.eu/). The ENSFI has at least 15 working groups, including one on drugs.

The ENSFI graciously agreed to send out a short email-based survey on our behalf so we could learn more about the data collected by these labs. Since it is unclear whether the ENSFI members are indeed representative of all labs, we were not attempting to get representative results that would allow us to make strong inferences. And since we had a short timeline and did not offer incentives, we did not expect to get a high response rate. Rather, we hoped to get enough responses from some large labs in some large countries for us to get a general idea of whether enough data exist to be analysed. To that end we were successful. We received 21 responses from labs in 16 countries and, for this particular analysis, we limit it to one per country by taking the lab that reported the most samples analysed in the previous month.

Of these 16 labs, 15 were publically owned, mostly by law enforcement agencies. All reported that they test the purity of illicit substances and Table 3.2 displays the number of samples that are analysed in a typical month in the responding labs. More than half of these labs reported testing at least 1,000 samples in a typical month. When asked about whether they collected information about the type of drug, quantity analysed and potency in a computer database, 15 of the 16 reported responded yes. Asked when the institute began entering this information into a computer database, the mean and median were both close to 1999 (min. – before 1980; max. – 2005). This suggests that there is a wealth of computerised information that can be analysed to improve our understanding of drug markets in a number of EU countries.

Table 3.2. Distribution of illicit drug samples assessed for purity in a typical month

Samples per month	Number of labs
<250	3
250–999	4
1000–1999	6
2000+	3

The survey also asked the respondents to approximate the number of labs in their country which assess purity, as well as guess about the total number of samples tested in a typical year. Table 3.3 reports these results. We should not put a lot of stock into these figures since they are estimates and we did not make any attempts to validate these figures; however, the orders of magnitude should be insightful for analysts looking to do more work in this field.

Table 3.3: Number of illicit drug samples assessed for purity in a typical year for 16 countries, based on estimates from ENSFI members

Country	Would you share purity data with select researchers for statistical analysis?	Approximately how may institutes in your country assess the purity of illicit substances?	Approximately how many samples of illicit drugs are tested in a typical year for the entire country?
Belgium	Yes	5–10	>=1,000 & <10,000 samples
Czech Republic	Yes	5–10	>=25,000 samples
France	Yes	11–20	Do not know
Germany	*	21+	*
Hungary	Yes	2–4	>=10,000 & <25,000 samples
Ireland	Do not know	1	>=25,000 samples
Italy	Yes	21+	>=25,000 samples
Norway	Yes	1	>=25,000 samples
Poland	Yes	Do not know	Do not know
Estonia	Yes	1	<1,000 samples
Slovakia	Yes	1	<1,000 samples
Spain	Yes	5–10	Do not know
Sweden	Yes	1	>=25,000 samples
Switzerland	Yes	5–10	>=1,000 & <10000 samples
Ukraine	No	11–20	>=25,000 samples
United Kingdom	Yes	1	>=10,000 & <25,000 samples

* Not reported

Another important insight from Table 3.3 is the overwhelming willingness of these labs to share purity data with select researchers for statistical analyses. While we cannot extrapolate these results to all labs in the EU (even those that are ENSFI members), this is indeed an encouraging sign. Labs willing to share this information will likely require a number of protections to make sure these sensitive data are neither misused nor distributed to non-approved researchers. To help streamline the process and decrease the time it takes to obtain these data, it will be useful for an institution (e.g. ENSFI's working group on drugs) to collect or develop forms and data protection agreements and make them readily available on the internet.

3.3.2   Purity-adjusted price

As noted in the introduction, it is critical to distinguish between raw prices and purity-adjusted prices when thinking about the relationship between demand and supply of an illegal drug like cocaine, heroin or methamphetamine. The example we provided focused on the fact that most drugs purchased at the retail level are usually diluted by dealers trying to expand their profit margin and dealers often do not necessarily know the precise purity of what they are selling. Thus, it would not be unusual if a gram of heroin purchased for €75 (the raw price) in one part of the city was 20 percent pure and in another place it was 30 percent pure. In this example, the purity-adjusted prices would be €375 per pure gram of heroin (€75/0.2) and €250 per pure gram of heroin (€75/0.3), respectively.

To make this point even more concrete, Figure 3.3 presents the actual purity of nearly 240 heroin transactions made by undercover police officers or their informants in New York

City between 2000 and 2003. In each instance, the buyer paid $100 for the bag of heroin, yet the range in actual purity of heroin received in the bag went from 0 percent pure to nearly 95 percent pure.[14] This finding is not unique to New York City – similar variation has been observed in other cities in the US as well as parts of the UK and Australia.

Figure 3.3: Potency of heroin purchased for $100 in New York City 2000–2003
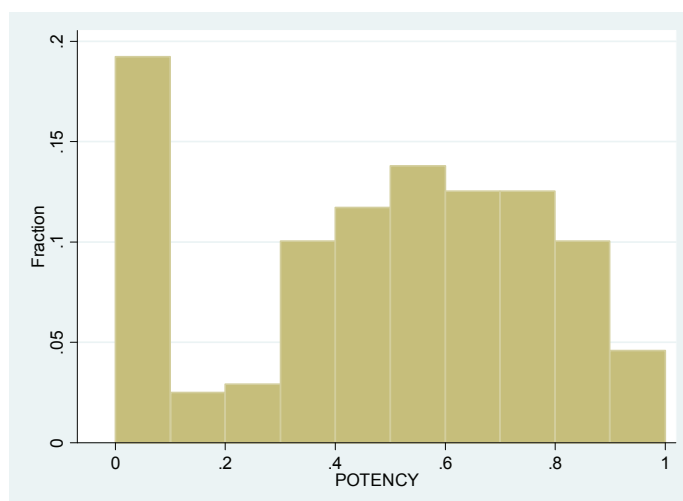
Source: N=239. Primary analysis of the US Drug Enforcement Administration's System to Retrieve Information from Drug Evidence (STRIDE)

To truly understand what is being traded and to appropriately monitor and analyse these markets, one needs to know not just the amount traded and the gross (nominal) amount paid, but also the purity of the drug that was traded. If law enforcement agencies successfully reduce supply in a region, drug-dealers could respond by raising their monetary prices to account for the fact that demand will not have changed. However, they could also respond by maintaining their current price and diluting the product that they sell. Building on the example from above, the dealer who sold €75 one-gram bags at 30 percent purity could add diluents to account for the reduced supply and now sell it at 20 percent. In this case the purity-adjusted retail price would increase by 50 percent (from €250 to €375). However, if law enforcement simply examined the raw-price per gram, it would look as if the law enforcement intervention had no effect.

Figure 3.4 presents a real-world example of how purity-adjusted price data can be used to better understand the impact of law enforcement. A recent study published by a RAND researcher examined the effects of a major supply shock to the methamphetamine market in the US (Dobkin and Nicosia, 2009). In 1995, the United States Drug Enforcement

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[14] There is serious debate about what to do with zero-purity observations in STRIDE (Appendix A; Arkes *et al.*, 2004; Caulkins et al, 2004). In some cases they are missing values and for others they represent a true rip-off – a purchase was made for a substance that contains no heroin. There are a lot of zero-purity observations at the left tail of the weight distribution and this has been attributed to the difficulty of assessing the purity at very small levels (Arkes *et al.*, 2004, 9). To address this issue, the following analysis is based on seizures where the total weight seized >0.05 grams, which reduces the analysis sample by approximately 25%. It still may be the case that some of the remaining zero-purity observations are indeed missing values, but the probability is much lower. The results do not qualitatively change if we drop all zero-purity observations from these calculations.

Agency successfully shut down two major precursor distributors of precursor chemicals for methamphetamine production in the United States, responsible for more than 50 percent of the precursors used in the country. Dobkin and Nicosia (2009) show, using monthly time series data, that this supply shock led to an increase in the price per pure gram of methamphetamine from less than $100 to almost $1,200. While the abrupt increase demonstrates how enforcement can influence the market and subsequently consumption (Dobkin and Nicosia also show how this shortage led to a reduction in use among arrestees and a decrease in amphetamine-related hospital admissions), it is also important to note how quickly the market rebounded and the purity-adjusted price fell back to below $100 (in less than 12 months). This has important implications for law enforcement officials as it shows how quickly other suppliers can respond to a change in the market.

Figure 3.4: The price per pure gram for methamphetamine skyrocketed after a major law enforcement intervention in the US

Methamphetamine Price per Pure Gram, Price and Purity
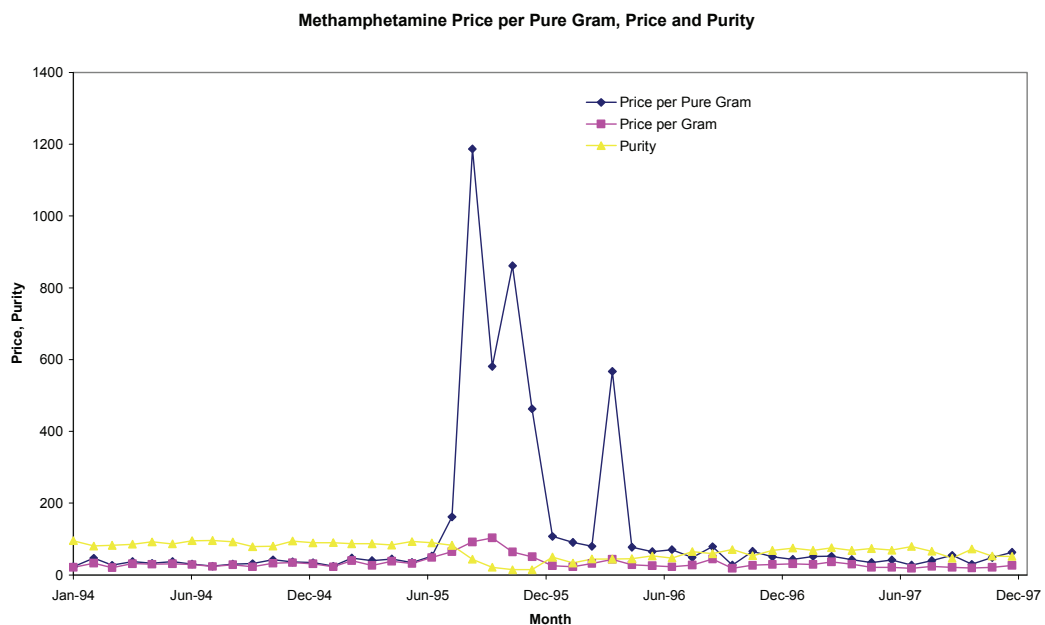
Source: Dobkin and Nicosia (2009)

Unfortunately, obtaining national or even local purity-adjusted price information for illicit drugs within Member States is challenging. Some challenges are largely unavoidable, for example the need to rely on administrative datasets not designed for tracking prices. Other problems, such as the fact that drugs are not generally sold in standardised quantities or qualities, can largely be handled by using appropriate econometric techniques.[15] Because of these complexities, greater effort has traditionally been devoted to collecting and reporting data related to demand than to quantities purchased and the price and purity of these transactions. That is unfortunate, because 1) prices affect drug use and consumption, 2) many outcomes of interest relate to expenditure, which is the product of price and quantity

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[15] A reviewer noted that the application of spatial and epidemiological models may also yield important insights into purity, and drug markets in general.

consumed, and 3) price data are an important tool for understanding the workings of drug markets and interventions intended to control those markets.

The EMCDDA should be commended for collecting price and purity data from a variety of sources and standardising them in a manner that allows us to establish a general idea about broad trends in price and purity. Indeed, RAND relied on these data heavily in our previous project conducted for the European Commission DG JLS (Kilmer and Pacula, 2009). These data are the best available for most European countries, but these sort of aggregate data are insufficient for conducting careful analyses of how illicit drug markets work, how they respond and move in response to changes in enforcement, and whether targeted enforcement strategies are effective in a given time or place.

Retail price data (unadjusted for purity) are submitted to EMCDDA and the minimum, maximum, mean and mode for each MS are presented in the *Statistical Bulletin.* However, EMCDDA notes that in some cases, the data are submitted from local rather than national monitoring systems, and sometimes from ad hoc, non-repeated studies. As can be seen in Table 3.4, the type of information systems (police sources, surveys among drug users, etc.) and the sampling strategies used to produce data on the price of illicit drugs at retail level vary considerably between countries.

For most EU countries, purity-adjusted prices are not available. In the UK, the Serious Organised Crime Agency (SOCA) has a programme of forensic work with the Association of Chief Police Officers (ACPO) to collect purity-adjusted prices for large-scale seizures.[16] Only recently have they begun to look at small quantities. Fortunately, there is recognition of the value that purity-adjusted prices will provide for law enforcement officials and policy-makers.

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[16] http://www.publications.parliament.uk/pa/cm200708/cmselect/cmhaff/296/8012903.htm

Table 3.4: Sampling frame for price data reported to the EMCDDA in 2007

Country	Reporting Organisations	Sampling frame (if reported)
Belgium	Federal police services	
	French Community outreach	Collected by health workers from needle exchange programmes, by street workers and health workers in recreational settings in different cities
Bulgaria	The police and the local regional institutions (Municipal Drug Councils) DNS police Ministry of Interior	
Czech Republic	National Drug Squad (Národní protidrogová centrála)	Prices reported from district headquarters of the Police of the Czech Republic
Denmark	National Commissioner of Police	Based on information gathered on the streets and during interrogations
Germany	Federal Criminal Police Office (Bundeskriminalamt BKA)	Drugs seized and delivered by the Land Offices of Criminal Investigation
Estonia	Central Criminal Police	Drugs seized by the police and the Customs Board
Ireland	Garda Síochána	Based on street prices gathered by the Garda National Drug Unit
Greece	Central Anti-drug Coordination Unit-National Intelligence Unit (SODN-EMP)	Reported by dealers and drug users arrested, and by police informants
Spain	National Central Office for Narcotics (Oficina Central Nacional de Estupefacientes)	Police reports based on investigations and information provided by dealers and drug users
France	National Identification System for Toxins and other Substances (SINTES)	Analyse drugs seized by law enforcement bodies (police, gendarmerie, customs) and drugs collected through social services (health, etc)
	TREND Observatory	Gathers information from users (active users – by going to squats and the streets and at parties – by going to clubs, festivals, open parties, etc) and from people working in prevention, care or repression
Italy	Anti-drug Central Service Division (DCSA) of the Ministry of Interior	
Cyprus	Drug Law Enforcement Unit (DLEU)	40 user reports and police undercover purchases in all units in every district
Latvia	Organised Crime Enforcement Bureau	
Lithuania	Drug Control Department under the Government of the Republic of Lithuania	Seized amounts of drugs and psychotropic substances in the last years
Luxembourg	Specialised Drug Department of the Judicial Police (NFP RELIS)	Key informants and inquiry data / periodically
Hungary	National Focal point study	Questionnaires completed by drug users and submitted to National Focal Point
Malta	Malta Drug Squad	Drug prices are collected only once yearly by four police inspectors – this method is not extensive or reliable enough to ensure the integrity and reliability of the data
Netherlands	Trimbos Institute 'THC-Monitor'	Samples of different cannabis products (about 1 gram each) are regularly procured from a random sample of 50 coffee shops and chemically analysed
	Central Bureau of Investigation of the Police Forces (CBI) branches	Questionnaire filled out by Police Headquarters on maximum of ten retail prices based on operational data, investigations or the police informers
	Drugs Information and Monitoring System (DIMS)	

Country	Reporting Organisations	Sampling frame (if reported)
Austria	Federal ministry of the Interior/Federal Criminal Agency (BMI/Bundeskriminalamt) representation by Gesundheit Österreich GmbH/Austrian Health Institute (GÖG/ÖBIG)	Undercover purchases by police agents
Poland	Information Centre	Collection of police-recorded data
Portugal	Instituto da Droga e da Toxicodependência / Institute for Drug and Drug Addiction through the Ministry of Health (IDT)	Based on data collection of the Criminal Police (PJ)
Romania	General Directorate for Countering Organized Crime (GDCOC)	Based on data collected by anti-drug police officers operating under the Anti-drug Directorate from the Romanian National Police
Slovenia	Ministry of the Interior – Police Department	Details in: Report on the Drug Situation 2006 of the Republic of Slovenia
Slovakia	National Anti-drug Unit of the Organised Crime Office in the Presidium of the Police Force (NADU OCO PPF)	Drug prices are not monitored statistically or recorded; information is provided by officers non-systematically
Finland	National Bureau of Investigation, Criminal Intelligence Division	Information comes from police reports of an offence
Sweden	CAN regional reporting system: Narkotikaprisutvecklingen i siffror	
UK	Serious Organised Crime Agency (SOCA) Independent Drug Monitoring Unit (IDMU) Druglink (DrugScope's magazine)	Seizures by police and HM Customs and Revenue Surveys festival goers, face-to-face and internet Journalists call drug services and police forces in 20 areas
Croatia	Ministry of the Interior	Report information from criminal investigations and special measures (purchase simulation) from 20 police departments
Norway	SIRUS (Norweigen Institute for Alcohol and Drug Research) Police Headquarters of Oslo	As part of mapping the illegal street market; need to read their documents
Turkey	General Directorate of Security, Department for Anti-Trafficking and Organized Crime (KOM) National Police	Investigation of judicial transaction files, intelligence reports and informer information and interviews with interrogators by asking security forces two times randomly over one year

Sources: Authors' extraction from each country's 2007 report to the EMCDDA (2007)

There are at least two approaches Member States can use to generate purity-adjusted price information

While a growing number of surveys across the world inquire about how much users pay for a specific quantity of the good (e.g. a gram or ounce of cannabis), this information is only of limited value since these surveys do not ask about the purity of the purchase. As mentioned in the previous section, the actual value of the drug is a function of quantity purchased, price paid and the purity of the drug. But even if surveys did inquire about purity, this information would likely be limited as most sellers and users do not know the precise quality of what they are exchanging (Caulkins, 1994; Caulkins *et al.*, 2004; Ben Lakhdar, 2009). Thus, information on purity-adjusted prices cannot come solely from self-reported surveys. That being said, self-reported information about price-per *raw gram* is

now being used in very innovative ways to generate information about purity-adjusted prices, and this will be discussed later in this section.

We begin by discussing the most common approach for generating purity-adjusted prices: transaction-level information from law enforcement agencies. In some jurisdictions, law enforcement agencies will not only record the price paid and total quantity purchased during an undercover drug operation, but they will also send the seized drug to a lab for purity testing. In addition, some jurisdictions will send undercover law enforcement officials to several different places and see how much of a drug they can purchase for a fixed price, with no intention of making an arrest. This product will then be sent to the laboratory for purity testing and also often for signature testing to determine where the product came from.

In both these cases, we can use the transaction-level data to calculate the purity-adjusted price:

(1)   Price per pure gram = (Total price paid)/(Number of grams*Purity)$^{\beta}$,

where β measures the extent of quantity discounts in the market (Caulkins & Padman, 1993). But if we want to create a price series that more accurately captures the prices faced by users, then we need to account for the fact that users do not know the purity of what they are buying – they make their decisions based on the expected purity. RAND developed a method for using these transaction-level data to generate a price series that accounts for expected purity (Caulkins *et al.*, 2004). This approach has since been adopted by other researchers (Institute for Defense Analyses, 2008).

While transaction-level information from law enforcement agencies is preferable for generating purity-adjusted prices, it may not be feasible for some Member States to collect this information, especially in the short run. In some countries there are economic barriers, legal barriers or both. In these cases we must consider different approaches to generating purity-adjusted prices, and recent work by Caulkins and colleagues presents a credible alternative (see Appendix A). Instead of obtaining price and purity information from the same transaction, it is possible to create a purity-adjusted price series using information from two sources:

1.   purity information from seized drugs or samples
2.   raw price information from surveys of drug users.

Since many EU countries submit seized drugs to labs for purity testing, acquiring this data would not require a tremendous outlay of resources (especially since our survey reveals that many labs already have purity data stored in computer databases and they are willing to work with outside analysts). Survey information about prices can be obtained from members of the household population, arrestees, those entering drug treatment, or convenience samples of drug users.

Caulkins' first application of this approach was part of an investigation to better understand heroin markets in Australia and the impact of the 2001 heroin drought (Moore *et al.*, 2005). Panels A and B of Figure 3.5 display a time series of Australian heroin purity data from forensic labs and raw heroin price information obtained from Australia's Illicit Drug Reporting System (IDRS), respectively. The IDRS collects data from interviews with

regular injection drug users (IDUs) in the capital cities as well as key-informant interviews with those who have regular contact with illicit drug users. Each year they interview over 900 IDUs and ask questions about consumption; prices; and the availability of heroin, cocaine, methamphetamine and cannabis. While we must be careful about drawing conclusions from this information since this is a convenience sample of IDUs, this is a group that knows a lot about retail markets, especially since many are poly-substance users. For Panel A, Caulkins obtained the annual price information for a raw gram of heroin from IDRS and then used linear interpolation to generate monthly raw-price estimates.

Figure 3.5: Changes in the heroin purity and raw-price per gram in Australia

Panel A

Panel B
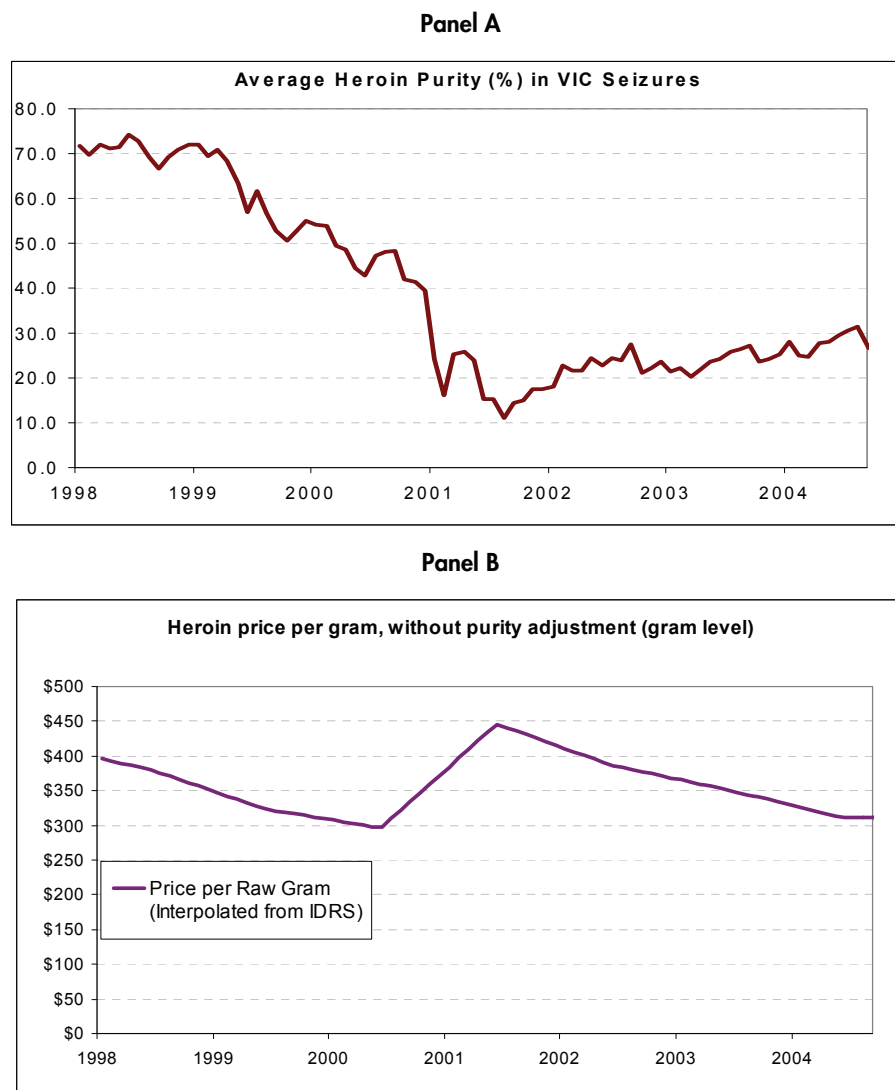
Source: Moore *et al.* (2005)

Caulkins then combines these data sources to generate a purity-adjusted price series. To validate whether or not this series reveals information that is accurate and useful to decision makers, he then compares the price information with data about the number of

ambulance calls.[17] We would expect that the heroin shortage would increase the purity-adjusted price and decrease ambulance calls since it would reduce the heavy consumption that leads to overdoses; thus, they should trend together. Figure 3.6 plots the actual number of ambulance calls and the predicted number of calls based on purity-adjusted prices.

Figure 3.6: Using high frequency forensic purity data and annual self-report raw price information from heavy drug users generates a purity-adjusted price series that is externally valid
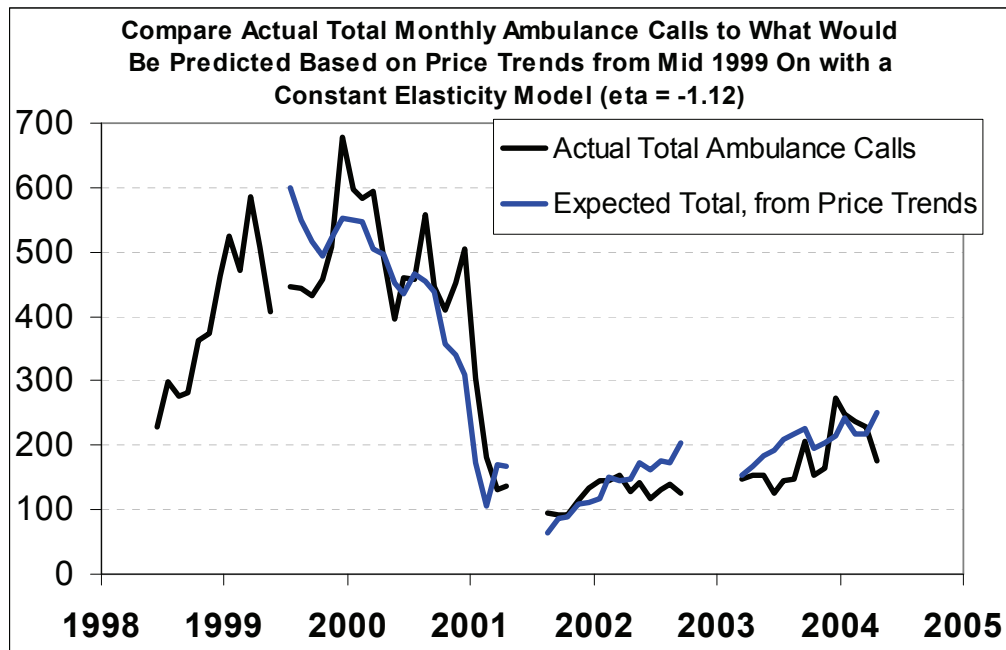
Source: Moore *et al.* (2005)

The similarity in the trends suggests that this alternative technique for generating the purity-adjusted price is promising. As Moore *et al.,* note:

> From mid-1999 on, the correlation between the actual number of ambulance calls and what would be predicted based on price alone is 93 percent, which means that 87 percent of the variation in overdoses in Melbourne from mid-1999 through early 2004 can be explained by price changes alone. As observed by Caulkins (2001), considering the imperfections in the data and the number of factors that are omitted, the strength of this relationship is striking (32).

Appendix A to this report includes new work, by Jon Caulkins, Sudha Sunil Rajderkar and Shruti Vasudev, which uses a similar approach for generating purity-adjusted price

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[17] More specifically: 'The price and overdose data is used to develop a third set of data: the number of overdoses that would be expected if they were determined only by prices through a constant price elasticity relationship. Mathematically, that means the number of overdoses is proportional to price raised to a constant. It is what one would expect if: 1) there was a constant price elasticity of demand and 2) overdose deaths were proportional to consumption. The exponent's value (-1.12) was chosen to minimise the sum of the squared difference between the actual and the expected number of overdoses from mid-1999 onward. Its value can be interpreted as the elasticity of ambulance calls with respect to price, meaning it is the percentage change in ambulance calls that was associated with a 1% increase in price. In other words, every 10% increase in the purity-adjusted price of heroin was associated with an 11.2% decrease in the number of ambulance calls.'

information for New York City and Washington DC. The authors demonstrate that this method 'yields purity-adjusted price trends for heroin, cocaine, crack, and methamphetamine which are consistent with those produced by standard methods, match those produced with a new "gold standard" approach that is relevant in certain special cases, and correlate with exogenous events and data trends.' Given the importance of purity-adjusted data, we strongly encourage the Member States, EC and other European institutions to consider employing this approach in the immediate future.

A critical issue to consider when using forensic data to develop a purity series is the method through which the observations are acquired (i.e. purchases versus seizures). If forensic data only come through seizure information made at entry points into the EU or a given Member State, then the data might not actually reflect the range of purities available at the street level. Evidence from the aforementioned STRIDE (System To Retrieve Information from Drug Evidence) database, which includes both seizure observations and transactions involving money, demonstrates this point in two ways. In work that RAND conducted for the Office of National Drug Control Policy, we examined purity data based only on purchase transactions and found that the expected purity of the exchange varied substantially depending on the level of the market in which the transaction was made (Arkes *et al.*, 2004; Caulkins *et al.*, 2004). As shown in Figure 3.7 for heroin, the average purity of smaller purchases more commonly made at the retail or middle-retail levels within the US (≤1 gram and <10 grams) is systematically lower than purchases involving larger quantities more typical of wholesale transactions (>10 grams). Nonetheless, the typical purities observed in a given year at each of these transaction levels is generally lower than when seizure data are also included. This can be seen when comparing average purities for a given year, as in Figure 3.7, with that reported in Figure 3.8. In 2003, for example, the average expected purity for heroin that was actually purchased was about 33–35 percent for lower retail amounts (<10 grams), as indicated in Figure 3.7. However, for that same year, Figure 3.8 shows that when seizure data are included, the average potencies are closer to 40 percent pure for the same size transactions. The average could only go up if the typical potency of seized amounts is consistently and systematically higher than that for purchased amounts.

Figure 3.7: Expected purity of heroin in the US only based on purchases
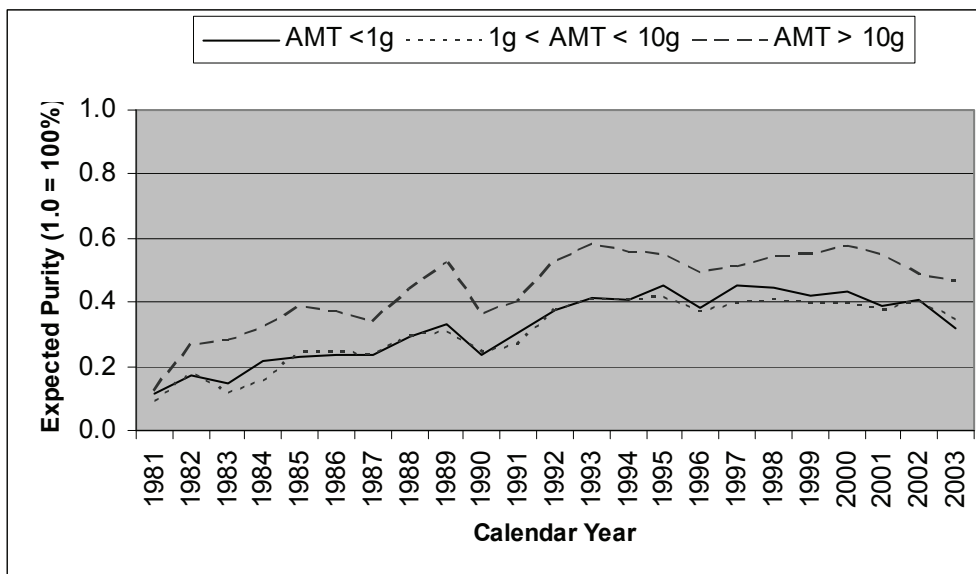
Source: Caulkins *et al.* (2004)

Figure 3.8: Average purity of heroin seized or purchased by US DEA agents
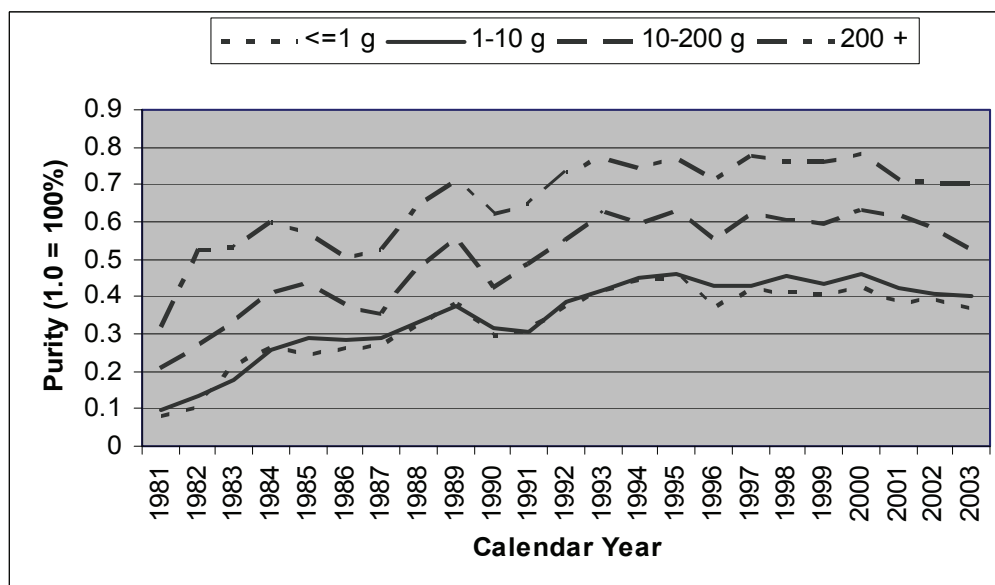
Source: Caulkins *et al.* (2004)

Keeping that point in mind, the value of collecting purity information through acquisitions that make it to a forensic lab would be an important starting point for generating a time series in any location. When purity information is coupled with semi-regular information on raw price paid, which could be obtained through local population surveys, interviews with injection drug users, or even through questionnaires administered at the intake to treatment, one could construct information on purity-adjusted prices for

specific areas at relatively low cost. Regardless of the approach, it is preferable to collect this price information at multiple points (e.g. monthly or quarterly) throughout the year.

While some countries can obtain purity data from forensic lab tests of seizures, it is important to note there are alternative methods for obtaining purity data. For example, pill testing has been available at dance parties across Europe for more than a decade (EMCDDA 2001).[18] As for other drugs, the French Monitoring Centre for Drugs and Drug Addiction conducted a study where they interviewed heavy cannabis users and then asked respondents to 'donate' a small amount of their cannabis so it could be sent to a lab and tested (Ben Lakhdar, 2009). While this provides 'proof of concept' for obtaining purity information from non-law enforcement efforts, it is critical to remember that the purity data must be collected frequently if they are to be used to understand markets and law-enforcement efforts.

3.3.3 Quantity consumed

There are a variety of methods for calculating the total amount of illicit drugs actually consumed in a particular market. The supply-side approach uses estimates about production and how much is seized or lost on the way to its final destination. Combining these figures with information about prices generates estimates of the total size of the market. There are at least two different methods on the demand side. One is based on self-reported information about what individuals spend on illicit drugs; the other uses prevalence estimates, and combines them with assumptions about quantity consumed and retail prices to generate expenditure estimates. Each method has its own advantages and disadvantages, but in most cases the decision regarding which approach to use is a practical one determined by the available data for the market being considered. It is important to note that the methods are not mutually exclusive and, ideally, multiple methods could be used to try to triangulate available information from each, as has been done in previous attempts to measure the size of the drug market (e.g. Abt, 2001; UNODC, 2005).

One of the major impediments to understanding the size of drug markets is the dearth of information about the typical quantities consumed on a use day. Earlier reviews of the quantity-consumed literature will serve as a useful starting point for researchers interested in this question (Pudney *et al.*, 2006; Kilmer and Pacula, 2009); however, considerable work needs to be done in this area.

Fortunately, there are some simple actions that could be taken to improve understanding of both consumption patterns and retail expenditures. While the most obvious action would be to include new survey modules about purchases and quantity consumed, adding new sections to surveys can be expensive, burdensome or both. However, adding only four questions per substance of interest to the European School Survey Project on Alcohol and Other Drugs (ESPAD) or to the general household surveys would dramatically improve the precision of country-specific demand-side estimates, especially for cannabis. These questions would be: 1) How many days did you use 'Drug X' in the previous month? 2) On the last day you used 'Drug X', how much did you use? 3) Was this amount more than, less than, or the same as what you typically use on a typical use day? and 4) How much would it cost to purchase that amount?

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[18] http://www.emcdda.europa.eu/html.cfm/index1577EN.html

Another mechanism for improving the consumption and retail expenditure estimates would be for the EMCDDA to collect information about quantity consumed from the National Focal Points (REITOX) for a forthcoming annual report. The Focal Points could report their best estimates of the typical quantity consumed for light and heavy users for a variety of substances. Related to this, a few questions could be added to the United Nations Office on Drugs and Crime's (UNODC's) Annual Review Questionnaire about typical quantities consumed and whether this amount was in pure or raw grams. Even if this information is imperfect, it would improve country-level estimates of consumption and retail expenditure for illicit drugs.

While useful information about cannabis consumption can be obtained from records in general population and school-based surveys, in most countries insightful information about harder drugs will need to be obtained from other populations. If Member States are interested in learning more about the use patterns and drug market activities of heavy drug users who account for most of the consumption in mature markets, they should consider adding new questions and possibly new populations to their survey portfolios. In some countries it makes sense to target arrestees, while in others it may make more sense to focus on those entering treatment or convenience samples of heavy users.

3.4 Conclusions and recommendations

If Member States truly want to improve their understanding of drug markets through systematic data collection activities, priority should be given to systematically collecting information about purity-adjusted prices. This information is critical for a number of monitoring and analytical purposes. Without information about purity-adjusted prices, it is difficult to know how drug markets are responding to law enforcement efforts and other supply-reduction strategies, as information on purity-adjusted price is the only source of reliable information obtainable from illicit markets. Like prices for legal goods, purity-adjusted prices for illicit substances are determined by the intersection of supply (availability of the drug) and demand (willingness to pay for a drug of expected purity). Thus we can learn about how supply is changing in response to law enforcement by examining how purity-adjusted prices move when demand is held constant and enforcement has changed. Furthermore, information on purity-adjusted prices for illicit substances can allow researchers to assess the causal association between drug use and other outcomes of interest – in particular non-violent criminal activity.

One of the contributions of this project is the focus on alternative methods for generating purity-adjusted prices (Appendix A). There are at least two methods for collecting data on purity-adjusted prices that could be implemented simultaneously in different cities. In areas where transaction-level data from undercover drug operations is difficult or costly to obtain, integrating high-frequency purity information from forensic labs with survey data about the price paid by consumers will suffice. It is important to note, however, that this information does not have to be collected in every jurisdiction of every Member State in order to be useful in the short run. It would also be informative to systematically collect high-frequency purity information and low-frequency price information in a few strategic areas, such as major ports of entry for drugs and along key transit routes to inner drug markets.

Back-of-the-envelope calculations presented at our scientific expert meeting suggested that if one wanted to reliably detect a 10% change in mean purity (e.g. a decrease from 50% to 45%), researchers would need to collect at least 35 purity observations per period.[19] However, this assumes that the baseline value (50% in this case) is a known or hypothesised value, rather than an average computed from data set and thus subject to observational error. The appropriate sample size for a formal comparison of data from two time periods will depend on: the measure being examined; the size of the difference the analyst would like to detect; and the desired level of precision and statistical power of the test. Readers should pay more attention to the order of magnitude, rather than the exact figure produced by this rough calculation. Those seeking to rigorously analyze changes in purity data are strongly encouraged to consult with statisticians about conducting formal power analyses to determine sample size requirements (Cohen, 1988; 1992).

Based on these insights and the other research conducted for this chapter, we offer the following recommendations to better understand drug markets in Europe.

- Obtain and analyse existing forensic purity information for illicit substances at the national and sub-national levels. Some law enforcement agencies in Member States send all of their seizures to labs for testing, while others only submit samples if requested by the prosecutor. Results from our survey of the European Network of Forensic Science Institutes suggest that a majority of responding institutes have computer databases with purity information, with about half going back to the year 2000 or earlier. Given the importance of this information for understanding drug markets and supply-reduction efforts, we strongly encourage analysis of the existing data collected by these labs to inform understanding of what is available. While tabulating the number of samples available for each month and drug (preferably by sub-national unit) is a useful first step, work by Caulkins *et al.* (Appendix A) demonstrates that more can be learned from advanced statistical analyses that take advantage of regional and temporal variation in the data and external validity checks. This will, of course, require the cooperation of the labs; our survey results suggest that the vast majority of respondents would in fact be willing to share this information with researchers under certain conditions.

- Record and analyse information about undercover drug purchases in countries where this occurs. One approach to generating purity-adjusted prices is to use the transaction-level information obtained about the price, weight, purity and circumstances of undercover drug busts. This tactic is not used in all countries; but in those where it is frequent, it would be useful to use this information (possibly along with information about the purity of seizures) and apply RAND's methodology for generating price series (Caulkins *et al.*, 2004; IDA, 2008). The time and resources required for this effort depend on how much of this information is currently available in electronic format. This could be very time- and resource-intensive if it requires creating a database from hard copies of investigation files. But countries already have programmes where they make undercover purchases purely for data and monitoring

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[19] This assumed a coefficient of variation (standard deviation/mean) for purity equal to 0.3.

purposes. The US's Drug Enforcement Agency's Domestic Monitoring Programme (DMP) operates in almost 30 cities and, throughout the year, law enforcement agents and their informants see how much heroin they can purchase and of what type of quality for $100. Law enforcement or their informants make the purchase and then submit the entire package to the lab – there is no investigation of the seller, no strategic plan in terms of infiltrating a drug network. Given that it is not related to any strategic law enforcement activities, the purchases can be thought of as more random than the typical entry in a seizure database (although still not representative). From the perspective of data collection, we encourage other jurisdictions to at least consider this approach when deciding the best way to generate information about purity-adjusted prices.

- <u>Regularly collect information about drug prices and other topics heavy drug users</u>. To create a prices-series based on the methodology discussed in the Appendix, MSs will a need to collect low-frequency price information. This information could be obtained in a variety of ways, including surveys with arrestees, treatment participants, or a convenience sample of heavy drug users. Since drug law-enforcement activities are often temporarily effective at best, it can be difficult to study these disruptions if price information is only collected on an annual basis. Annual information collection is a useful first step, but it would be preferable if this information were to be collected on a quarterly basis. Inquiring with users about the price paid at last transaction as well as other information about the transaction (e.g. "Did you purchase from your regular dealer?") and the market (e.g. "Did you ever try to buy heroin in the past month and were you unsuccessful? If so, why?") would be very useful. It is also important to note that these surveys can be used to obtain information about a variety of topics (e.g. crime, health, welfare) and can be developed to have rotating modules where some questions can be asked every quarter, some can be asked annually, and others can be asked only once (RAND, 1999).

- <u>Collect information about typical quantity consumed by type of drug user.</u> One of the major impediments to understanding the size of drug markets is the dearth of information about the typical quantities consumed on a use day. RAND's earlier review of the quantity-consumed literature will serve as a useful starting point for researchers interested in this question (Kilmer and Pacula, 2009); however, considerable work needs to be done in this area. While useful information about cannabis consumption can be obtained from records in general population and school-based surveys, in most countries insightful information about harder drugs will need to be obtained from other populations. If Member States are interested in learning more about the use patterns and drug market activities of heavy drug users who account for most consumption in mature markets, they should consider adding new questions and possibly new populations to their survey portfolios. As noted above, in some jurisdictions it makes sense to target arrestees, while in others it may make more sense to focus on those entering treatment or convenience samples of heavy users. Obtaining information about typical grams consumed on a use day by frequency of use (e.g. past month, past year) would be a valuable contribution; and focusing on other subgroups would be even better (e.g. by age, gender, race/ethnicity).

Indicators for understanding supply-reduction efforts

Beau Kilmer, Rosalie Liccardo Pacula, Priscillia Hunt and Lila Rabinovich

4.1   Introduction

This chapter focuses on indicators that can be used to assess the effectiveness of interventions intended to reduce the supply of illicit drugs. While the European Monitoring Centre for Drug and Drug Addiction (EMCDDA) developed indicators for assessing demand-side strategies, the development of related measures for the supply side is still an emerging field in the EU. That being said, the EMCDDA, other European agencies, and Member States have been doing important work in this area and this chapter relies heavily upon these efforts.

Our work complements these existing efforts in a number of ways. In this chapter we take a broad approach, thinking about ideal indicators as well as assessing the available data collected in the EU. Specifically, this chapter 1) presents a framework for thinking about supply-side interventions, 2) develops an inventory of existing data available within Member States and at an EU level for the assessment of supply-side interventions, and 3) discusses indicators that can be used to measure different aspects of these supply-side interventions. Some of these indicators can be created with existing data and in other cases new data collection processes would have to be developed. We also draw on the insights and experiences of third countries that have developed related indicators. In completing these tasks, we will assist the Commission in determining relevant policy needs for statistics and information at EU level and ascertain to what extent these needs are feasible and/or covered by existing data collections.

As in Chapter 3, we highlight the importance of collecting information about purity-adjusted prices for understanding whether law enforcement activities have influenced the market. Another important point made in this chapter is that information about the total number of seizures and the total grams seized is of limited value for understanding changes in drug markets and supply-side interventions. At a minimum, it would be useful to also include information about the median weight seized so it will be possible to know whether a few large seizures are having a large effect on these statistics. What would be even better is if information about the total number, total weight, median weight (and purity information, if possible) was reported for transactions at different levels of the market. The 'weight bins' that generally capture the retail, mid-level retail and wholesale transactions

will likely differ by drug (e.g., <10g, 10g-100g, etc.), but reporting information for these bins will allow law enforcement officials to learn more about whether certain activities are influencing the market. At the aggregate level, it is more difficult to detect changes over time. To be most useful, law enforcement officials should be consulted about what these bins should actually be for the different drugs and levels of supply.

Experts from the EMCDDA note that the seizure information that is reported by the National Focal Points is not generated by the same process for each country. In some countries there is one agency with detailed information about all seizures while in others there is one agency that collects summary information about total seizures and weights and then aggregates this information before submitting it to EMCDDA. In the case of the latter, it may take a lot of time and effort to obtain information by bins; however they may be defined for that country. Member States would be better served by adopting a common protocol for reporting seizure data.

The rest of this chapter will proceed as follows. The second section presents a framework for thinking about supply-side interventions, with a focus on three stages: production, wholesale distribution, and retail sales. The framework also demonstrates how indicators can be targeted at the relevant stage in the supply chain to measure the impact of drug reduction strategies. The third section discusses six categories of indicators as well as develops and critically assesses the existing data available to create these indicators. The fourth section focuses on indicators and new data collection systems that would improve our understanding of the effects of supply-reduction strategies/interventions in the European Union. This section will also be infused with insights from data analyses and data collection efforts in third countries.

4.2   RAND's framework for supply-side interventions

We begin by introducing a framework intended to help us think about indicators that can determine whether supply-reduction interventions influence the market. The size of the supply chain depends on a number of factors (i.e. the type of product, location of the producers and consumers) and is not fixed over time. Figure 4.1 displays the supply chain for bringing drugs to the market; the supply-reduction strategies associated with each activity in the supply chain; and possible indicators that can be used to determine whether the strategies influence the market and its participants.

The utility of this type of conceptual model is that it provides an analytical starting point that highlights the following:

- the different levels of the market

- how specific strategies may target only one segment of the market while others may target multiple segments

- how some strategies target multiple substances while others target only one.

The first column of Figure 4.1 contains the three main blocks of activity in the drug supply chain (production, distribution/wholesale, retail sales). Within each activity are sub-blocks of added-value tasks. The arrows symbolise transportation, as product moves from one main activity to another. For example, a drug is produced and then transported for

wholesale distribution. It is possible that transportation occurs within an activity block (i.e. the cultivator transports the product to a processing lab); however, the arrows simply illustrate necessary transport or product movement.

The second column displays some of the supply-reduction strategies intended to target different levels of the supply chain. Some strategies involve only one stage of the supply chain whereas others, such as arrest, can influence all levels. This model will be different for each substance since the composition of the drug varies and some steps in the supply chain differ. There are some indicators that are informative for more than one stage; however, the units of measurement may differ depending on the activity in the supply chain. For example, drug seizures will be in hectares for seizures of plants on farmland and in kilograms for seizures of drug powder.

The third column lists the possible categories of indicators that can be used to determine whether these interventions are actually making a difference. After briefly describing the supply sources and enforcement strategies employed against the ATS (amphetamine-type substances), cannabis, cocaine and opiate markets in the EC, the remainder of the chapter focuses on thinking about supply-side indicators and whether they can be systematically generated using existing data. We will also use this framework in Chapter 5 to help us think about drug-related crime.

Figure 4.1: General framework for thinking about supply-reduction indicators
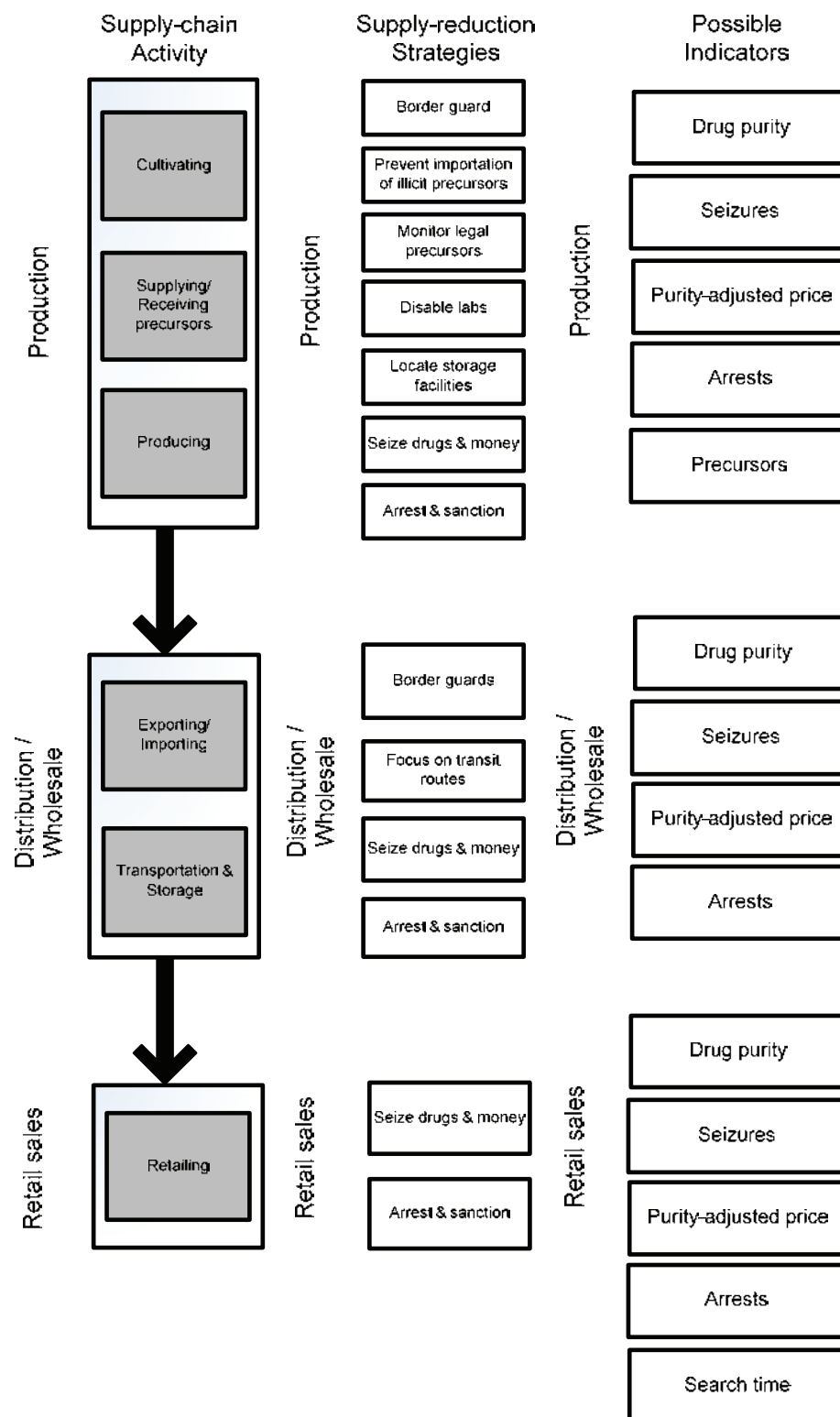
Note: For clarity we have only listed a selection of possible supply-reduction strategies.

4.3   Sources of supply and supply-reduction strategies

This section does not provide an exhaustive review of how the ATS, cannabis, cocaine and opiate markets operate in Europe. For that information, there are several recent publications that should be consulted, namely the:

* United Nations Office on Drugs and Crime's *2009 World Drug Report* (June 2009)
* International Narcotics Control Board's *Report of the International Narcotics Control Board for 2008* (February 2009)
* EMCDDA's *2008 Annual Report* (June 2008)
* US Department of State's *2009 International Narcotics Control Strategy Report* (February 2009)
* EMCDDA-Europol joint publication on *Methamphetamine: A European Union perspective in the global context* (July 2009)[20]
* Summary of the CZ PRES survey of specialised police squads on drug crime situation/markets (May 2009)
* Europol's *Project COLA: European Union Cocaine Situation Report 2007* (September 2007).

The goal of this section is to briefly summarise how these markets operate in Europe and highlight the supply-reduction efforts targeted at these markets. The proceeding section (Section 4.4) then provides detailed information about indicators that are useful for understanding these supply-reduction efforts and to what extent they can be constructed and analysed in Europe.

4.3.1   Cocaine

The EMCDDA estimates that four million people used cocaine in the past year and roughly half of them used it in the previous month before being surveyed.[21] Standard caveats apply about the problems associated with general population surveys, and studies suggest that respondents are more likely to lie about the use of more stigmatised drugs. The prevalence of cocaine has increased in Europe in recent years and, in 2005, Spain had a past year prevalence rate in the general population (3 percent) that exceeded the rate for the US (2.3 percent), a country known for having a serious cocaine problem. However, it is important to note that cocaine use in the US peaked about 25 years ago.

Source. The primary source of cocaine that is sold in European markets remains the Andean region of South America, with Columbia mentioned most frequently by law enforcement as the country of origin as indicated by seizures; followed by Peru and then Bolivia (UNODC, 2009). These three countries represent the originating source in 96 percent of all cocaine seizures (UNODC, 2009). The main countries through which cocaine enters Europe are Spain, Portugal, the Netherlands, Belgium and Italy, with the first two countries representing a significant share of cocaine seizures of known origination (UNODC, 2009; Europol, 2007). Large amounts (i.e. multi-tons) of cocaine are

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[20] This is the first of six planned joint publications on specific drug markets planned through to 2011.

[21] http://www.emcdda.europa.eu/drug-situation

transported from South America to the EC using maritime shipment routes, which is why these countries have emerged as the primary points of entry. A sizeable amount of cocaine is also smuggled to Europe via couriers and air freight (Europol, 2007). Primary points of entries for couriers and air freight include the Netherlands, Spain, Portugal, the UK, France and Germany (Europol, 2007). Roads, post offices and hospitals[22] play a small role in terms of the quantities involved, although not in terms of actual seizures.

Given the predominant use of maritime routes for smuggling drugs, law enforcement has intercepted several shipments of cocaine en route from a range of South American countries – including Columbia, Venezuela, Brazil, Ecuador, Chile and Argentina – to Europe. However, it is widely believed that the most significant amounts of cocaine are smuggled from South American to Europe via the Caribbean (Europol, 2007). The use of the Caribbean as a primary smuggling route is due at least in part to historical connections between Caribbean islands and some Member States. Two other primary maritime routes have also been identified. One, referred to as the 'central route', has drugs transiting from South America via Cape Verde or Maderia and the Canary Islands to various parts of Europe. The other route emerged during the early and mid 2000's through West Africa via Brazil. In 2007, UNODC's analysis of seizures in Europe suggested that approximately 27 percent of the cocaine consumed annually in Europe was being transported through West Africa, which was up substantially from 1998 when this route was basically non-existent (UNODC, 2007a). The drugs would then transit from Africa into Europe by sea, air, parcel post, couriers or via roads (Europol, 2007). Overland cocaine smuggling routes from West Africa would follow those traditionally used for cannabis smuggling.

More recent seizure data from 2008 and 2009, in conjunction with information on the reduced purity of cocaine in Europe and higher prices, suggests that the importance of Africa as a cocaine transit region has declined considerably since its peak in 2007 (UNODC, 2009). Although not a perfect indicator of its relative importance as a transit route, information in the UNODC's individual drug seizure database suggests that in 2008 only 7 percent of drug seizures transited Africa (as opposed to 28 percent in 2007) and this downward trend has continued through the first quarter of 2009 (UNODC, 2009). Similar declines in the number of African cocaine couriers have also been reported in European airports. Recent reports of importation via eastern European countries (including Bulgaria, Estonia, Latvia, Lithuania, Romania and Russia) may indicate the development of a new trafficking route into Europe (EMCDDA 2008). These countries have also been engaged in the trafficking of ecstasy and precursor chemicals (Europol, 2007), so it may be that they are developing from previous networks engaged in the trade of other illegal products.

Boats, cargo freighters and container ships remain the most common ways for moving cocaine to Europe (Europol, 2007). Packages are also dropped from aircraft into international waters, often to be picked up by fishing boats and small watercraft. When transporting cocaine out of West Africa by sea, fishing boats with African crews and South American and/or European controllers are often employed and packages are unloaded along the northern coast of Portugal or in Galicia in Spain.

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[22] Seizures occur in hospitals due to people hiding cocaine on their physical body or digesting them in capsules.

According to the Cocaine Situation Report (Europol, 2007), Columbian criminal groups control the vast majority of the importation of cocaine into the European Union but the trafficking networks used by these groups are heterogeneous and international. In addition to working with Spanish, Portuguese and West African organisations at primary transit locations, they are also believed to closely cooperate with criminal organisations in France, the UK, the Netherlands and several other countries, building connections in a variety of ways that suit their needs. To assist with processing cocaine, they often use chemists in Europe. For transportation, they cooperate with European skippers, pilots, high-tech specialists, trained couriers, and people who specialise in concealing goods and laundering the proceeds from transactions. To facilitate the transportation of their product, Columbian groups have established ties with shipping agents within the transportation industry, fishing industry and fruit companies (Europol, 2007).

There is also some evidence that South American organised crime groups have relocated to parts of West African countries to control some of the wholesale distribution of cocaine to Europe through this route, as well as to secure a staging area for storage, repackaging and re-routing of drugs (Europol, 2007). In Portugal and Spain, several laboratories being used to transform cocaine base into cocaine hydrochloride have been seized as recently as 2006. These labs were believed to be operated by criminal groups made of Spanish, Columbian, Venezuelan and Ecuadorian nationals (Europol, 2007). Thus, there is clearly close cooperation between the South American organised criminal groups and networks within Europe.

According to Europol (2006), there is an array of businesses that get used to help cover up or assist in the delivery of cocaine into Europe as well as across Europe, including restaurants, bars, cafes, estate agents, travel agents, transportation and vehicle repair companies, and fast-food franchises. Individuals, and in some cases businesses, assist with the forging of documents facilitating the transportation of cargo at various inspection points. Companies that help transport cocaine include construction companies, import/export businesses and producers of perishable foodstuffs. Money exchange programmes and telecommunications are used to assist in the laundering of money that comes from the sale of cocaine. As many of the investigations focused on cocaine trafficking frequently result in the confiscation of firearms, heroin, cannabis and other criminal assets, it suggests that the criminal organisations involved in trafficking cocaine are also involved in other illegal markets.

Supply-reduction strategies. A big focus of the European Community's supply-reduction strategy for cocaine (as well as other illicit drugs) is intelligence-led law enforcement, a term used to refer to the exchange of information across national and international agencies to make investigations more efficient and effective (Europol, 2007; EU Drug Action Plan, 2009–2012). The goal is to enhance the cooperation of effective law enforcement in the EU and focus limited resources on targeted individuals within criminal organisations who are significant because of their role in the cocaine trade, their harmfulness to society, and/or the impact they have on the environment in which they operate. As part of this a number of European-level coordinated efforts led by Europol have emerged, including the ongoing Project COLA that targets Latin American associated criminal groups engaged primarily in the trafficking of cocaine to Europe. This operation also provides operational support to current investigations being led in specific Member

States. There has also been the establishment of the Europol Cocaine Logo System (ECLS), which combines information related to seizures with information related to the physical situation and modus operandi of the individuals involved in the trafficking, including photos and information related to logos, packaging and markings. Analysis of these sorts of physical attributes can help match seizures sent from the same organisation within Europe and provide intelligence regarding how the organisation is operating.

The primary way this concept of intelligence-led law enforcement gets implemented is through the European Criminal Intelligence Model (ECIM), which is a cyclical process that is in place to facilitate the coordination of information (Europol, 2007). It starts with the annual Organised Crime Threat Assessment (OCTA), conducted by Europol, which identifies current and future drug trends as well as knowledge gaps and intelligence requirements for collecting information related to those trends. This then leads to the development of intelligence products by the Member States, which can be used for targeting top criminal organisations within the Member States. In addition, a cocaine-specific Comprehensive Operational Strategic Planning for the Police (COSPOL), initiated by the Police Chiefs Task Force, has been developed to identify opportunities for collaboration in operational aspects of law enforcement as well as efforts to reduce the barriers associated with day-to-day cooperation of these national and international agencies (Europol, 2007).

The Maritime Analysis Operations Centre-Narcotics (MAOC-N) is a multinational law enforcement initiative set up by the EU Member States. The Lisbon-based centre utilises information to engage military or law enforcement teams to stop the distribution of illicit drugs in Europe. Since MAOC-N focuses its area of operations from the eastern Atlantic, to the Cape of Good Hope in South Africa and up to the Norwegian Sea, it is mainly involved in disrupting the cocaine trade (Home Office, 2007).[23]

In addition to these region-coordinated efforts, there are international efforts to reduce the diversion of potassium permanganate, which is used for the processing of cocaine, from legal markets to illegal markets. The initiative, referred to as Operation Cohesion, is designed to reduce the ability of specific nations to process cocaine. The International Narcotics Control Board (INCB) now tracks global seizures involving potassium permanganate, the knowledge of which can facilitate identification of key routes in which cocaine might travel in various forms (EMCDDA, 2007; Europol, 2007).

Seizures are the primary national activity undertaken by Member States to reduce the flow of drugs to their markets. While the vast majority of the world cocaine seized occurs in South and North Americas, an estimated 78 metric tons were seized in Europe in 2007, with the bulk of that amount (37.8 metric tons) seized in Spain (UNODC, 2009). Seizures are not necessarily targeting just cocaine, however. Like most national drug strategies, the activities apply to the general reduction of all illicit drugs, not just cocaine. However, at various points in time, specific Member States have initiated particular initiatives to target the cocaine market specifically. For example, in 2006 Ireland set up Operation Plaza, an investigation run by the Garda National Drugs Unit to understand the sale and supply of cocaine and crack cocaine in the inner-city of Dublin (EMCDDA,

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[23] http://press.homeoffice.gov.uk/press-releases/maritime-centre-launch?version=2

2007). Similarly, Portugal has been engaging in widespread investigations of criminal networks engaged in the cocaine trade, using key informants in major transit countries like Brazil and Cape Verde (EMCDDA, 2007). In 2002, the Netherlands instigated a 100 percent control of all flights into Schiphol airport originating from high-risk cocaine trafficking countries, including Antilles, Aruba, Suriname, Venezuela and the Dominican Republic. The efforts to closely monitor and check not just the planes but their passengers and cargo as well, including the use of body scans to detect swallowed drugs, resulted in an average arrest of 175 couriers each month in 2005. The Netherlands also initiated similar preventative measures in departing countries (100 percent controls, radar, and body scans) (EMCDDA, 2007).

4.3.2 Opiates

It is unclear how many people consume heroin and other opiates in Europe each year. The EMCDDA has encouraged and collected estimates of problematic drug use from member countries, but these data are also not available for all countries for the same year. While some of these estimates only report the number of IDUs (which could include amphetamine and cocaine users), some countries do report problematic opiate use separately. The EMCDDA notes that 'Estimates of the prevalence of problem opioid use at national level during the period 2002–06 range roughly between one and six cases per 1,000 population aged 15–64'.[24] With approximately 300 million people aged 16–65 in the 27 Member States, this suggests a range of 300,000 to 1.8 million problem users. The United Nations also produces prevalence estimates in the *World Drug Report*; and in the input/output model they published in the 2005 issue, they estimated there were 1,450,000 past-year heroin users in Western & Central Europe.[25] The 2007 *World Drug Report* states that heroin accounts for about 97 percent of opiate use in West and Central Europe.

Sources. Afghanistan and Burma account for over 90 percent of the global production of opium (UNODC, 2008a). Afghanistan cultivates the vast majority of opium and some claim that approximately 60 percent of it is converted to heroin or morphine in Afghanistan before it is exported throughout the world[26] (UNODC, 2009). The largest proportion of opiates trafficked out of Afghanistan go through Iran (60 percent), followed by Pakistan (21 percent) and central Asia (19 percent) (Europol, 2006a). The major route for opiates supply to Europe is the 'Balkan route', which consists of three paths making their way out of Afghanistan, namely the:

- Southern path: Afghanistan–Pakistan/Iran–Turkey–Bulgaria–Macedonia–Kosovo or Albania–Italy
- Central path: Afghanistan–Pakistan/Iran–Turkey–Bulgaria–Macedonia–Bosnia & Herzegovina–Croatia–Slovenia–Italy

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[24] http://www.emcdda.europa.eu/themes/drug-situation/opioids

[25] While detailed comparisons of the methodologies employed to create the EMCDDA and UN estimates are beyond the scope of this report, there is one important discrepancy worth noting. The UN data for Spain in 2002 suggest that the number of opiate users was less than 55,000 (WDR, Table 1), but the 2002 range for problematic users of opiates reported to the EMCDDA ranges from 71,964 to 102,822; a difference of 30% to almost 100% (Spanish National Focal Point, unpublished).

[26] Ealier figures from UN officials put the figure as high as 90% (UNODC 2007b).

- Northern path: Afghanistan–Pakistan/Iran–Turkey–Bulgaria–Romania–Hungary or Ukraine–Slovakia or Poland–Austria or Germany.

The other route, the Northern route, leaves Afghanistan through central Asia to the north and is primarily headed for the Russian Federation. Some European countries, particularly northern, central and eastern European countries (including the Baltic States, some Scandinavian countries, Germany and Bulgaria), also receive supply of opiates via the Northern route (EMCDDA 2008a). A key characteristic separating the Northern route from the Balkan route is the lack of organisation along the Northern route (UNODC 2007b, EMCDAA 2008a).

Secondary trafficking routes for heroin were reported as going from south-west Asia to Europe direct, for example from Pakistan to where they were seized in the UK (EMCDAA 2008b). In addition, there are the indirect routes from countries in the Middle East and Africa to illicit markets in Europe and North America (EMCDAA 2008b).[27]

Turkish organised crime is responsible for importing and distributing heroin in the EU, in coordination with criminals along the Balkan routes (Europol 2005a). Its geographical location makes Turkey a vital link for heroin from Afghanistan to Europe. Turkish organised crime groups are reportedly very violent and protect their business with the use of extortion, kidnapping and physical violence (Europol 2005a). There have been several instances reported of contract killings related in some way to the heroin trade in quite a few European countries (Europol 2005a). These criminal groups are also known to target and corrupt key individuals within organisations, such as banks (Europol 2005a). While violence between criminal organisations exists when groups are not paid on time or because of theft, 'turf wars' are relatively rare (Europol 2005a).

The dominant European organised crime group in the heroin trade is the ethnic-Albanian network. Usually Kosovarian Albanians or Sanzak Muslim criminals, ethnic Albanian organised crime groups show significant involvement in heroin trafficking (Europol 2006b). The trafficking of heroin appears to be concentrated among few organisations. Most of the networks consist of a small number of individuals, freely trading with other groups of individuals (Reuter, 2000; Pearson and Hobbes, 2001; Natarajan, 2006).

Supply-reduction strategies. there are a number of policy options for reducing the supply of heroin, including eradication, alternative development, interdiction, and other law enforcement activities. In Afghanistan, the United Nations Office for Drug Control and Crime Prevention (ODCCP) launched a Strategy plan in early 2002 and the UK took lead on coordinating drug control assistance to Afghanistan.[28]

Eradication policy involves aerial spraying or ground-based operations and can be associated with environmental and health problems. Of the available strategies, eradication poses the highest risk to political stability and economic reconstruction in Afghanistan (Felbab-Brown 2005; Paoli *et al.*, 2009). Much of the triumph in alternative development

[27] While most of the heroin consumed in North America is believed to come from Colombia and Mexico, heroin from Asia is available, especially on the East Coast of the country (NDIC, 2008; Paoli *et al.*, 2009).

[28] http://www.unodc.org/pdf/afg/afg_strategy_2002-10-01_1.pdf

is found in regions in which the alternative development strategies were complemented by a broad array of food security initiatives and government services (Mansfield, 1999; Paoli *et al.*, 2009).

There are various Member State level efforts to reduce the trafficking of opiates, which usually involve cross-border information sharing. For example, the German Federal Criminal Police Office identified operations in which traffickers used trucks transported on ferries from Turkey to Albania, Croatia, Slovenia and northern Italy, which would then, in part, go on through Austria and Germany. For example, in 2004 Germany reported that 45 percent of all German heroin seizures took place close to the Austrian border (INCSR 2008).

In addition to national-level strategies to arrest and seize drugs, there are European-level strategies which involve information-sharing and data-gathering initiatives to identify drug-traffickers and their operations in order to reduce supply. As mentioned earlier, Europol is involved in intelligence sharing to implement Member State and EU-level illicit drug policies. Specifically, Europol plays a role in providing expert advice and analysis based on their large database. As an example of their operations to reduce the supply of heroin, one such operation involved the borders of 19 participating countries and inland, as well as on the external border of the EU. The Operational Coordination Unit was based within the World Customs Organisation in Brussels, where Europol placed a mobile office.[29]

4.3.3 Cannabis

Cannabis is Europe's most popular illicit drug, consumed by 3.8 percent of the population aged 15–64. In Europe, an estimated 13.4 million people have consumed it in the past month. Globally, it is estimated that nearly 50,000 tonnes of cannabis herb or resin is produced for consumption each year (Rödner Sznitman *et al.,* 2008); however, there is a tremendous amount of uncertainty surrounding production and consumption estimates (Kilmer & Pacula, 2009).

Cannabis is produced for three different end products:

- Cannabis herb – comprised of the flowering tops and leaves of the plant, smoked like tobacco using a variety of techniques. Depending on the region, cannabis herb is known under many different names, including 'marijuana', 'ganja' (South-Asia / Jamaica), 'dagga' (South Africa), 'dimba' (West Africa) or 'chira' (North Africa; usually cannabis resin powder). Cannabis herb accounted for 77 percent of global cannabis seizures in 2005.

- Cannabis resin – consists of the secretions of the plant in the flowering phase of its development. Cannabis resin is known as 'hashish' (North Africa and Europe) or as 'charas' (South-Asia). Cannabis resin accounted for nearly 23 percent of global cannabis seizures in 2005.

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[29] http://www.europol.europa.eu/index.asp?page=news&news=pr081121.htm

- Cannabis oil (hashish oil) – an oily mixture resulting from extraction or distillation of THC-rich parts of the cannabis plant. Cannabis oil is less widely used, and was believed to account for only 0.01 percent of all cannabis seizures in 2005.

In addition to these three basic end products, a number of cannabis combinations are found on the market, such as 'kif' (North-Africa, the chopped flowering tops of the female cannabis plant, mixed with tobacco), 'Bhang' (South-Asia, a beverage prepared by grinding cannabis leaves in milk and boiling it with spices and other ingredients); and 'White pipe' (South Africa, the smoking of cannabis herb in combination with tobacco and Mandrax) (UNODC 2007b).

Source. Cannabis is the most important drug in the world's illicit drug markets in terms of pervasiveness of cultivation, volume of production and number of consumers (UNDOC 2008). Its production is a global phenomenon; according to UNDOC it is produced in at least 172 countries worldwide. Two regions constitute the largest markets for cannabis products, including the largest accumulation of revenues: North America, where two-thirds of all cannabis products are sold (primarily in the form of marijuana); and Europe (which is the largest importer and consumer of resin or hashish) (Gamella and Jimenez Rodriguez 2008).

While the production of herbal cannabis is widely dispersed around the planet, including a growing number of European home-growers, the production of resin takes place in a few countries, including Morocco, Pakistan, Afghanistan, Lebanon and Nepal. Although statistics vary widely, in recent years 'Morocco's hashish production has been estimated in the range of 3,000 metric tons, with a market value of over $12 billion' (Gamella and Jimenez Rodrigo 2008). Most of this hashish is exported through Spain, which is currently the crucial transit zone for Moroccan hashish sold in the European market (*ibid.*).

Thailand, Afghanistan and Pakistan, various central Asian states and some countries of the former Soviet Union are also suppliers of cannabis to the European market. In addition, over the last decade, domestic cultivation of cannabis has become increasingly widespread, so that home cultivation has in some European countries become an important part of the cannabis supply. For example, the Netherlands has long been known to be a producer of marijuana, or 'nederwiet' (*netherweed*), which is produced for domestic as well as international consumption. In the last few years 'nederwiet' has been seized in the UK, Scandinavia, Germany, Belgium and France. Domestically-grown herbal cannabis became increasingly popular in the Netherlands due to strong improvements in cultivation techniques during the 1980s and 1990s. In the early 1990s, approximately 50 percent of the cannabis used in the Netherlands was domestically grown; this percentage continued to increase during the second half of the 1990s.

There is also evidence of increases in the supply of cannabis produced elsewhere in Europe. Switzerland and the Netherlands have, for instance, reported a sharp increase in illegal cannabis cultivation. Increases in domestic cultivation have also been reported in the UK, where there are indications that domestic cannabis cultivation may now make up well over half of the consumption there (EMCDDA 2008). Interestingly, research from the UK suggests that the distinction between social and commercial growers is blurred, as those selling to a small circle of friends can actually earn significant amounts of money (Hough

et al 2003). While data are limited, EMCDDA reports state that the majority of European countries now report local cultivation of cannabis.

Eurocannabis, as it is sometimes referred to, is different from cannabis produced outside of Europe. In terms of THC content, Eurocannabis tends to be stronger than marijuana produced outside the region, but not than hashish from Morocco, Lebanon and Pakistan (Jansen 2002). While over the period 2001–06, the potency of resin and herbal cannabis remained stable or decreased in many of the 16 European countries for which data are available, upward trends were noted for imported cannabis resin in the Netherlands and for herbal cannabis in seven other countries.[30,31]

The previous section indicates that according to UNODC data, cannabis is produced in over 170 countries. While many of these countries produce primarily to satisfy local demand, a number of countries produce for mass export. According to analysis by Gamella and Jimenez Rodrigo (2008), there is a range of organisations and networks involved in smuggling and distributing hashish into Europe via Spain. These organisations vary in structure, strategies and main tasks. The researchers report that the smallest operations consist of individuals or small groups of people bringing the drug in their clothes, luggage or inside their bodies. A larger type of drug trade organisation includes networks that smuggle hundreds of kilos using boats, trucks or even small aircraft. These organisations often appear to collaborate with importers or regional distributors in other European countries. There are also large-scale importers that smuggle tons of hashish into Spain, which is then moved on to other European countries for wider distribution. Finally, there are groups that deal with dozens of tons of hashish at a time in industrial-like operations; these groups are often part of an international network, are armed and relatively organised, and have enough credit and capacity to invest in infrastructure and move tons of hashish in every operation (*ibid.*).

The 'informal' nature of the cannabis market is compounded by the fact that, as mentioned before, a growing amount of cultivation is for personal use which is widespread in many countries (Leggett and Pietschmann 2008). Nevertheless, it is worth noting that substantial international trafficking of cannabis does occur, although it is unclear what share of the total market the internationally trafficked cannabis comprises.

Supply-reduction strategies. Given the increasing proportion of cannabis that is grown within the EU, it is interesting to examine the different types of policies in relation to cannabis production and cultivation across the EU. These vary significantly. For example, while in some countries cultivation for personal use (small amounts) are treated on a par with possession (e.g. the Netherlands), in others cultivation is prosecuted and could be subject to fines, cautions and even custodial sentences (e.g. Sweden, France, Portugal, the UK) (Hough *et al.*, 2003).

Large-scale cultivation of cannabis – which in countries like the Netherlands and the UK often occurs indoors – is targeted by law enforcement and a dismantling of the facilities

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[30] See: http://www.emcdda.europa.eu/themes/drug-situation/cannabis (as of 24 September 2009).

[31] It is important to note, though, that there are many other chemicals in cannabis in addition to THC (e.g. CBD).

(Jansen 2002). For instance, more than 1,500 'cannabis farms', with 400 plants per site on average, were reportedly closed down by police in London in 2005–06 in the UK, and an estimated total of 6,000 cultivation sites were dismantled in 2005 and 2006 in the Netherlands.[32] Across Europe, both indoor and outdoor cultivation has been reported, with the size of operations varying substantially; for instance, outdoor plantations have been found to range from a few plants to several thousand in large sites intended for commercial purposes.[33] Small-scale cultivation is reported to be on the increase in the region; some 70 percent of the cultivation operations detected in 2003 involved less than six plants (UNODC 2006).

Research on the effectiveness of supply-side policies such as eradication (cannabis, poppy and coca production); alternative development (which encourages growers to switch to legitimate crops); and in-country enforcement of measures to tackle the illicit drug trade (such as training investigators, strengthening the judiciary and improving extradition procedures) is also limited.[34] Interestingly, research has shown that in the Dutch case, in areas in which coffee shops are present up to about 70 percent of the cannabis sales went through these establishments rather than through 'non-tolerated' cannabis dealers. The persistence of these dealers in areas with coffee shops relates primarily to coffee shop densities and locations, opening hours, minimum ages they have to adhere to, and so forth (Korf, 2008).

4.3.4 ATS

Amphetamine-type substances (ATS) include amphetamines and methamphetamines as well as methcathinone, fenetylline, ephedrine, pseudoephedrine, methylphenidate and MDMA (WHO, 2008).[35] In 2006, 2 million Europeans used amphetamines, 2.6 million used ecstasy and, for comparison, nearly 4 million used cocaine. Methamphetamine is an emerging drug in Europe, with the bulk of consumption occurring in the Czech Republic and Slovakia (EMCDDA-Europol, 2009). Amphetamine-type substances take many forms (especially across countries), come from a variety of sources and, unless the drug is diverted from a legal source or tested by the user (e.g. at a rave), most users only have a general idea about what they are actually consuming (e.g. ecstasy sometimes includes meth).

Source. The UNODC reports that Europe is the world's largest producer of ecstasy and amphetamines (excluding methamphetamines; WDR 2008).[36] Precursor chemicals generally come from China or Russia[37,38] and since they often have legitimate uses,

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[32] See: http://www.emcdda.europa.eu/themes/drug-situation/cannabis (as of 24 September 2009).

[33] See: http://www.emcdda.europa.eu/themes/drug-situation/cannabis (as of 24 September 2009).

[34] An important exception is Mejia and Restrepo's (2008) economic evaluation of the anti-drug policies implemented in Colombia between 2000 and 2006.

[35] http://www.who.int/substance_abuse/facts/ATS/en/index.html (as of 24 September 2009).

[36] 'In the spring of 1989, most ecstasy pills were so-called "Stanleys", manufactured on a large scale by the German chemical company Imhausen just before ecstacy production was prohibited. These pills were industrially produced, and had a constant purity of 110 mg of MDMA' (Blickman, 2004).

[37] BMK from China (amphetamine), PMK from China (MDMA), PRP from Russia (amphetamine).

[38] Russia produces a lot, but mostly for the domestic market. (UNODC ATS report, 2008).

interdiction efforts are difficult. Machines that enable tabletting and other lab equipment associated with production are not subject to licensing in the Netherlands (Blickman 2004). Much of the production occurs in the Netherlands, Belgium and Poland; however, the extent to which the Netherlands dominates the market is unclear. Blickman (2004) notes that while the US attributes 80 percent of all ecstasy production to the Netherlands, the Dutch police suggest the figures is much closer to 40 percent.

Amphetamine-esque Captagon is 'produced on a substantial scale in Bulgaria for the domestic market as well as for export to Turkey and Middle Eastern countries such as Saudi Arabia'. There are also many 'kitchen labs' throughout Europe, where small-scale producers make enough for personal consumption and local distribution. Much of this production occurs with substances that are readily available (e.g. cold medicine).

Moving cocaine and heroin from producer to consumer requires several transactions and there is a clear wholesale market. This is not necessarily the case for ATS in Europe. At the extreme, there is no wholesale market for those who make small batches in crude 'kitchen labs'. And even when large-scale producers are involved, the production and wholesale markets may be the same. Massari's (2005) investigation of synthetic drug markets in three European cities suggests that 'two or at most three transactions are enough to link the importer to the final users'. Massari's research also suggests that many local dealers throughout Europe go to Amsterdam and other Dutch cities to make wholesale ecstasy purchases 'because it is easy to find contacts and links for setting up trafficking lines, without being disturbed by border controls in the European Union' (Massari 2005).[39]

Retail purchases of ecstasy often occur near or at raves, discos and bars. There does not appear to be a thriving street market as there is with other substances. There is much more variety with amphetamines, which are popular in the urban youth culture scene as well as in rural areas.

Supply-reduction strategies. In addition to many of the efforts described in the previous sections, law enforcement agencies have employed a number of strategies to dampen the ATS market. With respect to production, tremendous legislative efforts have been made to prevent precursor chemicals from being illegally imported or diverted from legal sources in Europe (e.g. the law on the Prevention of Abuse of Chemicals went into force in July 1995). It is more difficult to divert substances if countries know what is about to be exported and to whom. To this end, there is a lot of international information-sharing about precursor exports and reports of stopped/seized shipments (e.g. INCB's Project Prism).[40] At EU level, the Drug Precursor Working Group, established by the EU Drug Precursors legislation, also facilitates this information exchange and pay close attention to any diversion attempts of new precursors (see also Section 4.4.3). Since some production

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[39] 'In most of the Italian cases studied, the total quantity of drugs imported each time never exceeded a few thousand pills thus making their concealment much easier. Importer-users usually prefer frequent trips to the Netherlands for small amounts of pills over the risk of interception with larger quantities of the drug' (Massari *et al.*, 2003).

[40] 'The activities of the Project Prism in Europe have focused on preventing the smuggling of 3,4-MDP-2-P and P-2-P into the EU for use in the illicit manufacture of MDMA and amphetamine respectively.' http://ar2006.emcdda.europa.eu/en/page008-en.html (as of 24 September 2009)

occurs in small neighbourhood ('mom and pop') labs with licit precursors in the form of medicines purchased over the counter, at least one MS has passed a law restricting access to some of these medicines (for more information, see the Czech Republic case study in Chapter 6).

Seizures of precursors, as well as the final products, remove these substances and some of the market participants off the street. Seizing the assets of traffickers as well as confiscating cash involved in the transaction can influence the amount supplied in the market, although it depends on the size of the seizure and where it occurred in the supply chain. These arrests and seizures can also generate important intelligence information. The Collaborative Harmonised Amphetamine Initiative (CHAIN), which was set up by five Member States,[41] used forensic testing to help identify connections between seizures and trafficking groups. The project was terminated at the end of 2008 without having contributed to or resulted in any court conviction based on the information it produced. Arrests can also yield information if defendants participate in a plea bargain, that is, trade information for a reduced sentence. In some cases a plea deal may also involve setting up and possibly participating in a transaction to target other market participants.

Besides influencing the probability of arrest and seizure, another possible tool is the penalty associated with being convicted of these offences.

4.3.5 Applying the general framework to specific markets

Here we describe how the general framework (Figure 4.1) can be applied to specific markets. As made clear in the previous sections, many of the supply-reduction strategies can be applied to multiple markets (e.g. the efforts of MAOC-N); and at some levels of the market (e.g. import) the same organisation may be involved in multiple substances. In most cases the substance-specific models will closely resemble the general framework. There are a few notable exceptions.

The most obvious difference deals with strategies for addressing the upper-levels of the supply chain, given the various locations where the substances are cultivated and produced. Heroin and cocaine usually reach Europe in a form ready for consumption, but Section 4.3.1 notes that labs that convert cocaine base into cocaine hydrochloride have been detected in Spain and Portugal. Cannabis is still imported from Morocco and elsewhere, but a considerable amount of cultivation also occurs within the borders of the EU. Europe is a major producer of amphetamine-type substances, especially amphetamine and ecstasy, but it is by no means the only producer (UNODC, 2009). While the production of cannabis does not require inputs from other countries, this is not the case with ATS. This market relies on illicit precursor imports and their diversion from legal sources; and a number of specific supply-reduction strategies are therefore applied to this market at the upper levels (e.g. monitoring diversion).

Forensic profiling activities such as those carried out by the terminated CHAIN project are not only important for understanding changes in production techniques (e.g. types of precursors and impurities); it can also yield insights into the distribution and wholesale

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[41] The following countries participated in the project: Sweden, Finland, Germany, the Netherlands and the United Kingdom. Europol participated in the project.

levels of this market. For example, it is important to know whether similar packages/tablets end up in multiple locations throughout Europe or whether they are concentrated in a few locations. Collecting this information and tracking it over time can improve our understanding of the distribution channels and transit routes. Obtaining similar forensic evidence for other substances can help law enforcement agencies learn more about how the individuals they arrest and substances they seize are related.

Another major difference between the various supply-reduction strategies for these substances is how sellers are punished, especially at the retail level. As noted in Section 4.3.3., even the differences in how retail marijuana sales offences are sanctioned across Member States is dramatic. While the European Legal Database on Drugs includes important information about the ranges of sanctions available for punishing sellers, much more will be learned after the release of the EMCDDA's forthcoming Special Issue on drug offence sentencing.

Since there are major similarities across drugs for the broad categories (besides production) and important differences across Member States within these categories (e.g. sanctions), we do not produce separate figures for each drug.[42] Although general, Figure 4.1 serves its purpose in helping us think about 1) the different levels of the supply chain, 2) how policy can be used to influence actors at these levels, and 3) how to measure whether or not these polices and programmes actually influenced the market. The rest of this chapter is devoted to the latter.

4.4 Indicators for understanding supply-reduction strategies

This section discusses a host of indicators that could be used to assess whether supply-reduction efforts are having their intended effects. The five main categories include purity-adjusted prices, seizures (weight and purity), precursors, arrests, and availability.

4.4.1 Purity-adjusted prices

As described extensively in Chapter 3, knowing the purity-adjusted price at various levels of the market is critical for understanding whether supply-side efforts have indeed influenced the market. Simply focusing on raw prices can be misleading as suppliers can adjust the purity of their products in response to enforcement-induced shortages. But since the market price is determined at the intersection of both supply and demand, we must also consider quantity demanded when using these price data to make inferences about supply.

This is especially important when considering interventions that could influence both supply and demand. If the intervention simultaneously reduces the number of sellers (which could cause a shortage and increase price) but reduces demand by deterring consumers from entering the market (which could suppress the market price), one could see no change in the market price. This is what we see in Figure 4.2 where the quantity demanded moved from q_0 to q_1, but there is no change in price because there is an off-setting change in supply. While a complete off-set is unlikely, analysts must keep this in mind when using price data to make inferences about what is happening with supply.

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[42] It would be more appropriate to produce these figures at the state or sub-state level.

Since it is difficult to obtain high frequency survey data about demand, as most general population surveys only occur on an annual basis, analysts may also want to examine drug-specific data about treatment admissions, emergency room visits, ambulance call-outs, and possibly calls to the emergency services (e.g. 112). While these alternative measures of demand will most likely capture heavy users, this is not necessarily problematic as heavy users account for most of the consumption and purchases in mature drug markets.

Figure 4.2: Interventions that simultaneously influence demand and supply may not change the market price
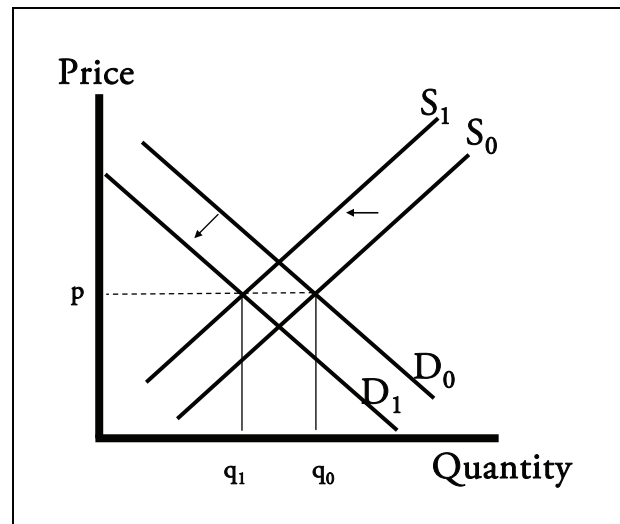
4.4.2 Seizures

Law enforcement seizures of illicit drugs serve at least four purposes. They:

1.   increase the deterrent effect of transporting drugs (product loss and identification of people to prosecute)

2.   impose costs on suppliers, which is believed to increase price (and hence reduce demand)

3.   generate information about the geographic flow of drugs into markets and the participants[43]

4.   provide a performance measure for law enforcement agencies.

With respect to the amount of illegal drugs actually seized by law enforcement:

> the quantity seized is a function of at least three factors: (1) the quantity shipped, (2) the relative skill of the interdictors, and (3) the care taken by smugglers (Reuter, 1995).

These factors motivate an important caveat about attributing a change in seizures over time to the interdictors. A decrease in seizures over time can occur because the enforcement agency becomes *more effective* and deters suppliers from trafficking drugs in their jurisdiction, or because the enforcement agency has become *less effective* and is unable to interdict the same number of shipments.

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[43] One could also obtain this type of information if there was a database of shipments that were not seized (e.g. from wire tap information). We thank Jon Caulkins for this insight.

When a large number of seizures occur or a large quantity is seized in a single event, law enforcement is heralded for being effective at interrupting the drug trade. However, while the extent to which seizures act as a deterrent to participants involved in these markets is not really known, there is evidence that it does not have much of an effect on the market. Many individuals involved in the transit of drugs are easily replaced (Kleiman, 1997; Caulkins, Burnett and Leslie, 2009). One important exception, where replacement is not as easy, is with large lab seizures. In the case of large lab seizures, it is more often the case that the individuals identified are in fact important for the production of drugs (at least at that lab).

The empirical evidence regarding the impact of seizures on the availability of drugs for consumption is limited. Yuan and Calkins (1998) find no evidence that high-level domestic drug enforcement influences drug prices in the US, but this does not imply that prohibition has no effect on prices – cocaine and heroin both sell for well beyond what we would expect in a legal market. Smithson, McFadden, and Mwesigye's (2005) study of Australia supports the hypothesis that large heroin seizures at the federal level reduce street-level heroin supply about a year later. Of course, the significance of seizures depends on the relative impact on the total quantity available. As noted earlier, Dobkin and Nicosia (2009) found that a 1995 Drug Enforcement Agency intervention which closed two major precursor distributors significantly impacted methamphetamine markets, and subsequently influenced hospital admissions, treatment admissions and methamphetamine-related arrests in California, with effects persisting for 12-18 months.

Intelligence agencies in Europe and elsewhere use information on seizures from source country, transit country and the final destination to better understand trade routes for particular drugs as well as the organisations that are involved in the transit of the drugs. Key findings are often presented in national and regional threat assessments (Europol 2007, 2008; NDIC 2009) and other government documents providing summary measures to the scientific community of general trends identified from these flows. Information in selected countries also report trends in potency of drugs seized at different points in the distribution chain, to better understand whether drugs get 'cut' or diluted as they move down the distribution chain (Caulkins *et al.*, 2004).

The utility of this information for policy purposes, however, can be greatly enhanced depending on how much information is collected about each seizure and how this information is maintained in databases. The type of information that is particularly useful for quantitative analyses include: date of seizure; location of seizure; reason for seizure (e.g. discovered during arrest, undercover purchase; passive or targeted); method and mode of transportation; number and nationality of persons arrested; origination of drug; expected destination of drug; type of drug, weight and/or number of packages (e.g. 1 kilo or 100 bags of crack) and, as previously mentioned, purity (if sent to a lab); and a type of 'identification code' that would make it easier to link related seizures. With this information, a variety of indicators could be created that could be used to better track changes in drug markets, including the:

- total number of seizures
- total weight seized
- drugs that get moved/distributed together

- distribution of seizure weights (minimum, maximum, average, mode, variance) by country, drug, time and market level
- expected and actual average purity, by source country, time and market level
- share of seizures coming from different countries and regions (this would be more accurate if there is a signature programme).

Learning about the number of different types of drugs obtained in a seizure can help law enforcement understand when certain trafficking routes are being used for multiple purposes or whether specific traffickers are moving into new lines of business. Additionally, information on the distribution (low, high, median and mean, as well as actual number of seizures on specific dates) of seizures in a specific location over time provides information regarding the relative importance of specific routes and whether there is seasonality in transporting of drugs along specific routes. In addition to collecting purity information, obtaining signature information about where the drugs are coming from can help determine whether average purity is changing in response to a shortage or excess of supply, or whether it is changing because the source of the drug has changed and the new source has a different purity (implying a change of purity that is independent of domestic-market enforcement activities).

Unfortunately, there exists no common protocol for reporting seizure data among the Member States. Most countries report information about the total number of seizures and the total weight to the EMCDDA via the Focal Points (Table 4.1). Some countries do report seizure-specific data to the UNODC on a biannual basis, which are publicly available, but it is important to note that purity information is not reported for these seizures (Table 4.2). Thus, it is not possible to make full analytic use of the information available from enforcement agencies' seizure activities to better track how various supply- and demand-side factors might influence the ability of law enforcement to affect these markets. While it is encouraging that the Pompidou Group has recommended that seizure-level data reported to Customs be made available for analysis by those in the liaison offices (via personal communication with EMCDDA officials), Member States should come to an agreement on a protocol so that more of this information can be incorporated into EMCDDA's annual statistical bulletin and hence for analysis. This protocol should also include doing something similar to the Customs data program for all seizures (not just those made by customs officials) that could be made accessible to intelligence officers and select researchers. The seizure-level data reported to the UNODC by many countries can serve as the foundation for this initiative.

In the US, a significant amount of research examining the structure of drug markets, the supply chain, and enforcement effects on these markets has been conducted because of the existence of the System to Retrieve Information from Drug Evidence (STRIDE) dataset. Since the early 1980s, the United States' Drug Enforcement Agency (DEA) has maintained this detailed administrative data system, which includes information on drug transactions (undercover purchases, sales, seizures and other drug acquisitions) made by enforcement agencies at the federal, state and local level engaged in law enforcement. The STRIDE data are rich in information that has been used by researchers and policy analysts, including the date, location (city and state or country) and nature of the acquisition

(seizure or purchase); weight, purity and chemical nature of the drug; and (for purchases only) the price paid.[44] STRIDE observations span a continuum of quantities. Transactions and seizures do not involve a few well-defined transaction sizes, as would be the case for legal markets. Hence, defining boundaries for different market levels is not precise when examining these data. Nonetheless, information from other sources (e.g. arrestee surveys and treatment populations) can be used to help identify common retail amounts; and location of seizures can help identify distribution sizes of quantities within the United States versus those done outside the United States.

Table 4.1: Sources of seizure information in the European Community

Country	Collected by
Belgium	Federal police and customs
Bulgaria	Ministry of the Interior – Chief Department for Combating Organized Crime /CDCOC/ Chief Department Border Police /CDBP/ and Chief Department Antisocial Deeds and Public Order Preservation and Prevention – National Police Service /CDASDPOPP – NPS/ Ministry of Finance – Customs Agency
Czech Republic	Police of the Czech Republic and Customs Service of the Czech Republic (Národní protidrogová centrála)
Denmark	Police and customs
Germany	Police and customs authorities
Estonia	Police and Customs Board
Ireland	Garda Síochána
Greece	SODN-EMP (Central Anti-drug Coordination Unit – National Intelligence Unit)
Spain	[doesn't indicate]
France	The police, customs, the gendarmerie
Italy	n/a: Doesn't report to EMCDDA
Cyprus	Drug Law Enforcement Unit
Latvia	n/a: Doesn't report to EMCDDA
Lithuania	[unclear]
Luxembourg	Specialised Drug Department of the Judicial Police
Hungary	Police and Customs
Malta	Malta Police Force and the Customs Department
Netherlands	Police forces, Royal Military Police, Customs and Fiscal Information and Investigation Service (the tax authorities)
Austria	Federal Ministry of the Interior/Federal Criminal Agency (BMI/Bundeskriminalamt) representation by Gesundheit Österreich GmbH/Austrian Health Institute (GÖG/ÖBIG)
Poland	Provincial Police Headquarters and the Police Headquarters of the Capital City of Warsaw, criminal police departments
Portugal	n/a
Romania	National Anti-Drug Agency (Anti-drug Directorate from the Romanian National Police)
Slovenia	Ministry of the Interior – Police Department
Slovakia	National Anti-drug Unit of the Organised Crime Office in the Presidium of the Police Force (NADU OCO PPF)
Finland	Police and Customs
Sweden	Police and Customs
UK	Law enforcement agencies except for customs data for Scotland
Croatia	[unclear]
Norway	Police and customs authorities
Turkey	General Directorate of Security, Department for Anti-Trafficking and Organized Crime (KOM)

Source: Authors' extraction from each country's EMCDDA National Reports (2007)

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[44] Some critics argues that STRIDE data should not be used for policy analysis (Masnki *et al.*, 2001; Horowitz, 2001); however, some of the major criticisms 'can be easily overcome through the adoption of random coefficient models of drug prices and by paying serious attention to drug form and distribution levels' (Arkes, Pacula, Paddock, Caulkins and Reuter, 2008).

Table 4.2 Countries reporting seizure-specific data to the UNODC (A=Amphetamine-type substances; C=Cocaine; M=Marijuana/hashish; O=Opiates)

Country	2002/1	2002/2	2003/1	2003/2	2004/1	2004/2	2005/1	2005/2	2006/1	2006/2	2007/1	2007/2	2008/1
Belgium									MCO	AMCO	MC		MCO
Bulgaria				O	O							MCO	ACO
Czech Republic	AMCO	CO	AMCO	AMCO	AMCO	AMCO	ACO	AO	AMCO				
Denmark	AMCO	AMCO	ACO	AMCO	AMCO								C
Germany					AMCO	AMCO	AMCO	AMCO	AMCO	AMCO	AMCO	AMCO	AMCO
Estonia					AMC								
Ireland		AMCO	AMCO	AMCO	AMCO	AMCO	AMCO	MCO	MCO	AMCO	MCO	MCO	
Greece	MCO	MCO	MCO	MCO	AMCO								
Spain	MCO	AMCO	MCO	AMCO	MCO	MCO	AMCO	MCO	MCO	AMCO	MCO	MCO	AMCO
France									MC	C	CO		MCO
Italy	MCO				AMCO					C	AMCO	AMCO	AMCO
Cyprus	MO				MCO	MCO							
Latvia													
Lithuania				AMCO	AMC	AMCO			AMC		AMO		
Luxembourg			C	C	C	C	CO	C	C	M	MC		MCO
Hungary													
Malta		M		M	MCO		MO	AM	MCO	C	CO	CO	MCO
Netherlands									C				C
Austria	MCO	CO	AMCO	AMCO	AMCO	AMCO	AMCO	MCO	CO	AMC	C	MCO	CO
Poland													C
Portugal	AMCO	MCO	MCO	MCO	MCO	MCO	AMCO	MCO	MCO	AMCO	MCO	AMCO	MCO
Romania				CO	AMCO	MCO			AMCO	AMCO	AMCO	MCO	MCO
Slovenia					MCO		MCO						
Slovakia					MCO	MCO							
Finland													

Country	2002/1	2002/2	2003/1	2003/2	2004/1	2004/2	2005/1	2005/2	2006/1	2006/2	2007/1	2007/2	2008/1
Sweden													C
UK			AMCO	MCO					C	AMCO	AMCO		C
Switzerland									MC	MC	MC	C	C
Croatia					AMCO	AMCO	AMCO	AMCO	MCO	AMO	AMCO	AMCO	MCO
Norway													C
Turkey	AMCO	AMO	AMCO	AMCO	AMCO	AMCO	AMCO	AMCO		AMCO	M		
Russian Fed				O	O	AMCO	AMCO	AMCO	AMCO	AMCO		AMCO	AMCO
Colombia	MCO		MCO	MCO	MCO	MCO		MCO	C		MO		
Peru													
Bolivia													
Afghanistan				O	O	M				O			

Notes: 'The information is presented per seizure case and contains details, as reported, on the type of drug, place and date of seizure, quantity seized, origin and destination of drug seized, means of transportation and the number and nationality of traffickers. An analysis of this data is included in the regional drug-trafficking trend reports and other statistical documents prepared by UNODC."' Information is only reported for seizures above these thresholds: Opium, cannabis herb, cannabis resin and cannabis plants: 1 kilogramme and above, Heroin, morphine, cocaine: 100 grams and above, Psychotropic substances: 100 grams and above, Seizures referring to trafficking by mail: All quantities.'

The primary limitation of the STRIDE data is that they are not a random, probabilistic or representative sample of all drug transactions occurring in a geographic area within the United States. They represent a convenience sample and, as such, the ability to make inferences about the general drug market from statistical analyses based on these data is limited. However, work conducted by RAND has shown that city-specific price and purity trends can still be constructed in an internally- and externally-valid manner if certain methods are applied (Caulkins *et al.*, 2004; Arkes *et al.*, 2008). Thus it remains the best source of information, on illicit drug prices and purity in the United States, currently available. No other data source provides as much objective information about the characteristics of the specific drug acquisitions over time for as many geographic areas as the STRIDE dataset.[45]

An important point made in this section is that information about the total number of seizures and the total grams seized is of limited value for understanding changes in drug markets and supply-side interventions. At a minimum, it would be useful to also include information about the median weight seized so it would be possible to know whether a few large seizures are having a large effect on these statistics. What would be even better is if information about the total number, total weight, median weight (and purity if possible) was reported for transactions at different levels of the market. The 'weight bins' that generally capture the retail, mid-level retails and wholesale transactions will likely differ by country and drug, but reporting information for these bins will allow law enforcement officials to learn more about whether certain activities are influencing the market. At the aggregate level, it is more difficult to detect changes over time.

To get a better understanding of the usefulness of presenting seizure information by weight bin, we examine nearly 14,000 heroin seizures reported in the STRIDE database between 1999 and 2003. Table 4.3 presents the descriptive statistics for the weight and purity for all of these seizures as well as those seizures weighing less than or equal to 1 gram and those of 200 grams or more. The former is a proxy for street-level retail transactions while the latter most likely represents seizures at the wholesale and import level.

The first point to notice in Panel A of Table 4.3 is the considerable variability in the weights of heroin seizures reported to STRIDE (0.05 to 357,000 grams). The second point is the large difference between the mean and median weights for the full sample. If one only focuses on the average amount seized (total grams seized divided by the total number of seizures), it may seem like the typical seizure is close to 1 kilogramme; however, the median tells a very different story. The median value of the heroin seizures reported during this period is in fact 1 ounce (28.3 grams). This discrepancy makes sense when one realises that there are some very large seizures that drive up the average. In Europe, where most of the published data focuses on total grams and total number of seizures (which can be used to calculate the average), it may be more insightful to focus on the median amount seized compared to the average which is much more sensitive to outliers.

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[45] National Incident-Based Reporting System (NIBRS). Focuses on seizures at the local level; useful for insights into retail transactions. Information available includes: type of arrest (drug possession, drug sales, or something else); suspected drug type (up to three reported); estimated quantity-levels; location of offence; date and time of day; age, gender, race, ethnicity, residence status of arrestee; whether or not the individual was armed; other charges (including information about the victims); city of arrest; and the police department making the arrest.

Table 4.3. Summary of heroin seizures in the US from 1999–2003

	Mean	Median	Min	Max
Panel A: Full Sample (n=13,749)				
Amount (g)	899.5	33.8	.05	357,000
Potency	0.54	0.51	0.0	1.0
Panel B: Amts < = 1 g (n = 3,740)				
Amount (g)	0.36	0.27	0.05	1.0
Potency	0.28	0.22	0.0	1.0
Panel C: Amts > 200 g (n = 5,473)				
	2304.6	780	200.1	357,000
	0.69	0.79	0.0	1.0

Panels B and C present the same information about seizures for different levels of the market. As we would expect, at the upper levels of the market we still see a large discrepancy between the mean and median (once again demonstrating the importance of very large transactions). The mean and median are much closer at the retail level (both close to 0.3 grams), although once again the mean exceed the median. This suggests that even if countries could only produce total weight and total seizure figures for two types of seizures, those of up to one gram, and everything else, we could get more information about what is happening at the retail level. Of course, more policy-relevant information could be obtained if data were provided for additional weight bins.

With information about the weights of each seizure, we may be able to get a better idea about the effectiveness of law enforcement at the import level by examining how the median weight changes over time. If there was only a minimal enforcement risk, we may expect that traffickers would be more likely to try to smuggle larger amounts. In this scenario, we would expect the few seizures that do occur to involve relatively large amounts of product. On the other hand, if there is a major enforcement risk, smugglers will be more careful to protect their goods and be more likely to use less efficient smuggling approaches (e.g. human packers instead of large boats – with the latter, more to lose and easier to get caught). In that world, controlling for everything else, the median weight would be relatively low. Thus, tracking the median weight for seizures over time would allow law enforcement officials to know if they are influencing the behaviour of smugglers. (Note: While it would be ideal to have this information quality-adjusted, it is still a useful measure if we only have the unadjusted weights.)

Table 4.3 also presents the descriptive statistics for the purity of the heroin seized. The potency of heroin varies from zero (rip-offs) to 1.0 (perfectly pure).[46] For the full sample the mean purity is 51 percent and as we would expect, the mean purity is much lower at the retail level (36 percent) than it is at the import/wholesale level (69 percent). This is consistent with the notion that suppliers dilute the drug as it moves down the supply chain in order to maximise profits. For the full sample, the mean is a good measure of central tendency, as it is very close to the value of the median (51 percent and 54 percent, respectively); however, that is only true for the sample overall. Although the range (spread)

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[46] See footnote 17 for a short discussion about zero-purity observations in STRIDE.

of potential potencies in small (less than 1 gram) and large (over 200 grams) seizures is the same (from 0 to 1), the average (mean) and median potency observed for these subsamples is in fact quite different, with the mean purity exceeding the median at the retail level while the opposite occurs in the upper level of the market.

To learn more about the variation in purity at the different market levels, Figure 4.3 displays the heroin-purity distributions for four weight bins: up to and including one gram; 1–10 grams; 10–200 grams; and more than 200 grams. At the lower levels of the supply chain (<1 gram and 1–10 grams), we see more low potency observations for small quantities than higher quantities, as indicated by taller bars to the left of the distribution rather than the right. But as we shift to the bins covering the upper levels of the heroin market, we see the distributions shifting to the right. This suggests that at the upper levels the seizures are much more likely to be of higher purity.

Figure 4.3: Potency of heroin seizures in 1999–2003 by weight bin
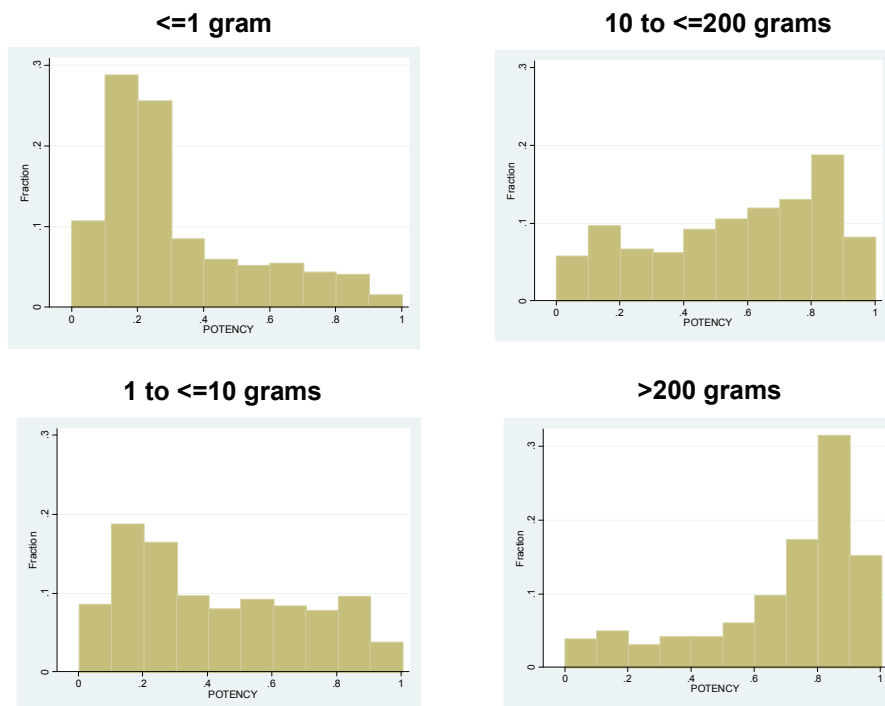
It is also important to note that there is a substantial variation in purity if we only focus on a single transaction size. Figure 4.4 displays the variation in purity for one-gram heroin seizures reported to STRIDE from 1999–2003. As we would expect based on these figures, most of the observations are less than 50 percent pure, but we do see some high-purity heroin being sold at this level of the market. Subsequent analyses (not presented here) suggest that this is not purely attributable to analysing data from several different regions. This is also consistent with the variation in purity of $100 heroin purchases (undercover) in New York City that is displayed in Figure 3.3.

Figure 4.4: Potency of Heroin for 1 gram seizures in STRIDE
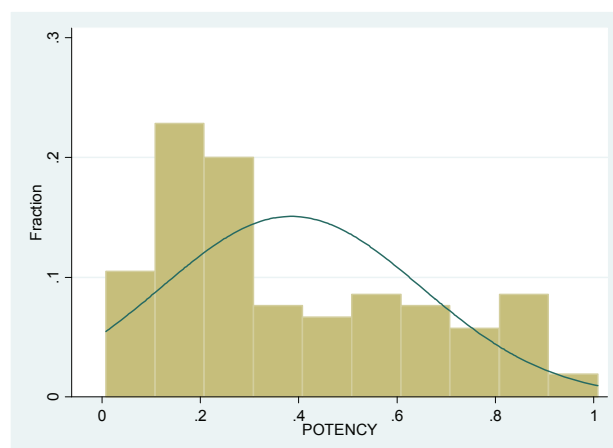
To conclude, the more information that is made available from the seizures, the more law enforcement officials and researchers can learn about what is happening in specific drug markets (by drug and supply level). For example, it is important to have individual-level information recorded for each seizure (amount, potency, location, date) so that one can consider the extent to which drugs are getting 'cut' as they move down the chain (more cutting may indicate a shortage). As mentioned in Chapter 3, one of our long-term recommendations is to create an international database with detailed information about specific seizures in Europe. While it will take years to create such a system, there are important efforts that Member States and European institutions can make in the short- to medium-term to learn more from existing seizure data.

4.4.3 Precursors

Closely related to the seizure of illicit drugs is the seizure of precursor chemicals used to produce ATS as well as dilute cocaine and heroin. As noted earlier in the chapter, precursor chemicals for ATS generally come from China or Russia, and since they often have legitimate uses, interdiction efforts are difficult. Fortunately, Europe has a strong infrastructure for monitoring and tracking precursor chemicals and the EU Working Group on Drugs Precursors. Many Member States also participate in the Pre-Export Notification Online (PEN Online).[47]

The European Commission publishes annually basic statistics in a form of *Summary Reports on EU Drug Precursors Seizures*[48] that are invaluable for understanding what is happening in the precursor markets, but many of the limitations listed in the previous section are applicable here. If there is a change in the amounts seized/stopped over time, it is difficult to know whether this was because supply-reduction efforts were more or less

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[47] 'In March 2006, the Board launched Pre-Export Notification Online (PEN Online), an automated online system for the exchange of pre-export notifications. As at 1 November 2008, 96 States and territories, including most major exporting countries, had access to PEN Online. Since the introduction of the system, over 16,000 pre-export notifications have been sent to a total of 169 States and territories using PEN Online.' http://www.incb.org/pdf/ungass/en/UNGASS_ENGLISH_Chapter%20III.pdf. (as of 24 September 2009).

[48] See: http://ec.europa.eu/enterprise/sectors/chemicals/documents/specific-chemicals/precursors/index_en.htm (as of 20 October 2009)

effective. By tracking information about the median weight by different weight bins (as suggested above), it may be easier to determine if certain efforts are influencing different parts of the market. In addition, to getting information about the distribution of seizure weights by country, substance, time and market level, it would also be useful to track information about the share of seizures coming from different countries and regions and how this changes over time. It could be the case that a successful operation could be offset with production/export coming from another country.

Based on presentations made by European Commission staff as well as other communications, three main recommendations were made with respect to improving the use of the data on seizures of drug precursors and stopped shipments:

- There should be enhanced implementation and use of quarterly reporting on seizures/stop shipments as foreseen by legislation;

- There should be improved coordination of the annual reporting about drug precursors seizures to the International Narcotics Control Board (INCB), allowing the European Commission to gather all 27 Member States contributions (Form D) and to report on behalf of the EU;

- Confidential information on legitimately used or traded drug precursors should be shared confidentially with the European Commission and Member States in order to better follow any new diversion patterns.

Our findings echo the first recommendation as these markets are dynamic and annual reporting may mask important changes and the effects of law enforcement activities. As demonstrated in the previous chapter, an extremely large disruption to the ATS precursor market in the US was hardly noticeable one year after the event.

With respect to the second recommendation, Form D is a 20+ page survey which asks countries to report the total number and weight of precursors seized (by substance) and the three countries where most of the seized precursors originated.[49] It also inquires about stopped shipments and licit trade and use of substances listed in the 1988 convention. Coordination of this process is currently problematic, as some MSs send their Form D directly to INCB with or without copying the European Commission, while others are only submitting it to the Commission as they expect it to be a global answer. This indeed delays the European Communities' global answer to INCB, while it duplicates answers from some Member States. This also speaks to a larger issue raised at the policy expert meeting about redundancies encountered when Member States have to submit related information to multiple national and international entities.

With respect to the final recommendation about trade data, it is important to note that many companies are not enthusiastic about sharing confidential information about the quantities of precursor chemical they use in their products or trade. This information is important since it can be used to better understand the amount of precursor diversion that is occurring through the legal market (assuming of course that the licit import data are reliable). While this information is made available to national authorities, it is not shared

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[49] See: http://www.incb.org/pdf/e/list/form_d_e.pdf (as of 20 October 2009)

with analysts at the European Commission if requested. Whether or not the national authorities share this sensitive information with other European institutions (e.g. Europol) is unclear, but there is value in exploring diversion from a multi-national perspective. If one Member State is particularly effective in reducing precursor diversion, it is critical to know whether this reduction is offset by increased diversion elsewhere. This information would be useful for analysis and intelligence purposes.

4.4.4 Arrests

Closely related to the seizure of illicit substances and diverted precursors are arrests for drug-law violations. Arrests for drug possession and selling are another useful indicator for understanding law enforcement efforts but, such as seizures, it is unclear whether a change in arrests is a result of more- or less-effective enforcement.

The EMCDDA collects drug-specific information on total arrests for possession and trafficking from the National Focal Points and publishes this information annually in its *Statistical Bulletin* (Table 4.1). Unfortunately, information about the number of drug-specific trafficking arrests is not presented. This makes it difficult to really measure what is happening with respect to supply-side reduction. The EMCDDA notes additional caveats when attempting to make cross-national comparisons:

> The stage within the criminal justice system at which data have been reported and recorded, vary sometimes across countries. For example, data on drug law offences might be recorded at an initial stage when a first report is made by law enforcement agencies, or after investigation by the Judicial Police, or even following a decision for a charge to be issued by the Prosecutor.

> Statistical units vary between countries. Some countries record offences while others record persons (or presumed offenders). . . . In addition to these [examples], when considering breakdowns by drug, here too, some countries report all drugs mentioned in a case while others record only the main drug (defined according to different criteria in different European countries).

> These differences – mainly in the stage at which the statistics are made and in the type of statistical units – lead to major difficulties when comparing data from different European countries. (http://www.emcdda.europa.eu/stats09/dlo/methods)

But as long as the method has not changed within countries, time-series comparisons can still be informative; however, it is important to note that the sales category is extremely vague as it includes very small-time drug-dealers as well as high-level traffickers operating at the multi-kilo level. This is largely an artefact of how drug-supply offences are classified in Member States and it will be difficult to obtain more precise data in the short term. Obtaining a better understanding of where these arrests fall upon the supply chain will be useful for understanding whether different enforcement activities are making a difference. As with seizures, it would be ideal to know whether this arrest was the result of a targeted investigation or routine policing.

Eurostat also collects information about drug-trafficking from the Member States; however, their contact points may not necessarily be the Focal Points used by EMCDDA (personal communication with Eurostat official). The Eurostat definition of drug-trafficking includes 'illegal possession, cultivation, production, supplying, transportation, importing, exporting, financing, etc of drug operations which are not solely in connection

with personal use'.[50] Table 4.4 compares the Eurostat and EMCDDA drug-trafficking offence data from 2001–2007.

There are noticeable differences between the EMCDDA and Eurostat estimates and they are not consistent across countries. In fact, there is only one country for which the figures are identical: Germany, 2002–2007. There are major, systematic differences in the estimates for Poland and Greece and it is not as if one data system is always larger. For 2007, the EMCDDA figure is 432 percent larger for Poland and the Eurostat figure is 118 percent larger for Greece. The size of the difference has also changed for some countries over time. For example, in 2001 the EMCDDA estimates for France were 34 percent larger and by 2007 the size of the difference had increased to 70 percent. There are also instances where the two data series show differing trends. The EMCDDA series shows a generally upward trend for Portugal from 2001–2007, whereas the Eurostat shows a generally downward trend after 2002.

There is on-going work with the institutions to address these discrepancies. In addition, there is a lot of discussion in Europe about harmonising criminal justice data systems (e.g. DG JLS) and creating common definitions. As the EC and Member States continue to advance their data collection process, it is critical to remember that arrests are only a part of the criminal justice system. For those wanting to conduct analyses about the effectiveness of different legal regimes and enforcement approaches for illegal drugs, it is important to focus not only on arrests but also on the probability of conviction and the average sentence actually served (whether in prison or under community supervision).

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[50] http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-SF-09-036/EN/KS-SF-09-036-EN.PDF

Table 4.4: Important and inconsistent differences in EMCDDA and Eurostat estimates of drug-trafficking offences

Country		2001	2002	2003	2004	2005	2006	2007
Belgium	EMCDDA	8291	7777	5651	6882	12177	12489	12869
	Eurostat	9547	9767	9810	10684	11454	11806	12454
Bulgaria	EMCDDA	--	834	1077	710	947	1000	587
	Eurostat	1487	1648	2006	2412	2720	2824	2844
Czech Republic	EMCDDA	1605	1791	2155	1947	1962	1942	1774
	Eurostat	4052	4114	3497	2803	2706	2668	2639
Denmark	EMCDDA	--	--	--	--	2762	--	--
	Eurostat	2553	2675	2667	3158	2738	2917	3258
Germany	EMCDDA	73162	76038	73375	75347	72002	64865	64093
	Eurostat	79787	76038	73375	75347	72002	64865	64093
Estonia	EMCDDA	--	--	--	110	1027	933	1048
	Eurostat	628	632*	604	494	686*	981	1449
Ireland	EMCDDA	1520	1530	1758	1608	2853	3040	--
	Eurostat	2198	2632	2430	2273	2751	3160*	3824
Greece	EMCDDA	--	--	3506	2908	4667	3937	3658
	Eurostat	9693	10001	10556	7761	8393	8152	7959
Spain	EMCDDA	17380	17430	12718	16299	16299	16766	25238
	Eurostat	12160	12133	11742	11947*	11968	12711	14098
France	EMCDDA	5438	7211	7922	8379	8027	7293	9849
	Eurostat	4047	5165	6094	6296	6108	5792	5797
Italy	EMCDDA	--	33106	29393	31474	31580	31807	--
	Eurostat	36045	37965	37288*	30053	32059	32306	34439
Cyprus	EMCDDA	--	201	201	158	208	124	176
	Eurostat	397	433*	475	514	611	653	875
Latvia	EMCDDA	--	--	232	93	--	79	422
	Eurostat	830	629	997*	1148*	1049*	997	1434
Lithuania	EMCDDA	--	--	--	--	--	673	728
	Eurostat	165	213	509	711	999	704	765
Luxembourg	EMCDDA	18	34	69	104	90	104	--
	Eurostat	1077	1321	1133	1342	1326	1201	1448
Hungary	EMCDDA	--	--	--	--	--	--	--
	Eurostat	4332	4790	3387	6678	7626	6740	4676
Malta	EMCDDA	109	110	104	154	116	116	--
	Eurostat	--	--	--	78	113	123	149
Netherlands	EMCDDA	--	--	--	15784	13983	13551	13302
	Eurostat	10380	12752	15633	15662	15305	16361	15657
Austria	EMCDDA	2366	2293	2490	1940	2308	2350	2067
	Eurostat	2399	2320	2506	2443	2337	2377	2473
Poland	EMCDDA	14675	14829	18917	21406	24363	22445	20904
	Eurostat	2219	2371	2577	3296	3608	3220	3926
Portugal	EMCDDA	1954	2214	2222	2277	2252	2359	2424
	Eurostat	3853	4053	3739	3654	3535	3610	3281
Romania	EMCDDA	--	--	--	--	--	1223	1184
	Eurostat	658	1074	1131	1775	2441	3079	2796

Country		2001	2002	2003	2004	2005	2006	2007
Slovenia	EMCDDA	1140	602	638	545	330	682	702
	Eurostat	1140	1162*	775	997	1026	1590	1429
Slovakia	EMCDDA	--	--	--	--	--	--	257
	Eurostat	652	674	734	711	843	411	470
Finland	EMCDDA	--	6617	6779	6028	5912	5669	5881
	Eurostat	14869	6617	5974	5269	5177	4837	5115
Sweden	EMCDDA	2527	2882	2642	2652	2616	2720	2578
	Eurostat	5086	5259	5129	4905	4670	6449	7026
United Kingdom**	EMCDDA	14576	14722	15588	16969	20969	20954	--
	Eurostat	19686	22435	24628	24190	25276	26570	28130
Turkey	EMCDDA	--	4409	6655	10532	6879	--	--
	Eurostat	4798	5662	5740	7789	8623*	14530*	26433
Norway	EMCDDA	--	5615	5747	5936	6056	--	--
	Eurostat	19945	19294	16152	16814	17118	19156	19086

EMCDDA: Drug law offences related to drug-trafficking. 'Drug law offences usually refer to offences such as drug production, trafficking and dealing as well as drug use and possession for use.' http://www.emcdda.europa.eu/stats09/dlotab5a. Source of information: National Focal Points.

Eurostat: Crimes recorded by the police: Drug-trafficking. From a document which published these data: 'Drug trafficking includes illegal possession, cultivation, production, supplying, transportation, importing, exporting, financing, etc of drug operations which are not solely in connection with personal use. 'http://epp.eurostat.ec.europa.eu/portal/page/portal/crime/data/database. Source of information: 'The methodology used in this publication draws upon that developed by the European Sourcebook of Crime and Criminal Justice Statistics. Most of the data are taken from information recorded or reported by the police.'

*   Denotes a break in the series according to Eurostat.

** Eurostat figure for England and Wales only.

4.4.5 Availability and market disruption questions

It is critical to remember that the money-price of a drug is only one of the costs associated with obtaining an illegal substance. Purchasers also have to spend time and effort obtaining the drug (i.e. the search cost). Thus, one measure of the effectiveness of supply-side strategies targeting retail sellers is whether or not the intervention increases the search time to find (potential) buyers. Many general surveys do include general questions about availability (ESPAD asks 'How difficult do you think it would be for you to get each of the following, if you wanted: Impossible, Very difficult, Fairly difficult, Fairly easy, Very easy, Don't know'); however these availability questions are usually too vague and the responses are open to wide interpretation.

There are other ways to obtain information about availability. Some surveys probe deeper and inquire about whether or not users tried to purchase a particular drug in the previous month but were unsuccessful, and if so, why. The EMCDDA produced a very comprehensive document which summarises all the efforts Member States made to collect information about availability.[51] This is part of a larger project by the EMCDDA to 'develop a new model on drug availability that could then be included in guidelines on population surveys…' The project is still ongoing and we look forward to learning about

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[51] See: http://www.emcdda.europa.eu/html.cfm/index67884EN.html. (as of 24 September 2009)

the draft guidelines and how they were externally validated. One possible validation approach would be to assess whether these measures correspond to any shocks to the supply system. Of course, this depends on whether there were any significant shocks to supply in the countries where the measures were validated. Until this happens, it will be difficult to ascertain how useful these measures will be for assessing law enforcement activities.

Related to this, one of the suggestions made at the Scientific Expert meeting was to consider using the ESPAD as a way of testing different types of questions about availability and market disruption for students via several different questions. We think this is worth considering and it will be important to draw on the insights from the EMCDDA's current work so as to avoid redundancy and make a useful contribution. It is also important to note that many of the heavy hard-drug users who account for most market transactions will not be picked up in the household or student surveys. Alternative approaches will be necessary to learn more about how supply-side efforts influence their search costs (e.g. surveys of arrestees or large convenience samples of heavy drug users).

4.5   Conclusions

Considerable efforts have been made to collect useful information about the demand and supply of illegal drugs at the international, national, and sub-national levels in Europe. However, given the difficulty in developing reliable indicators of supply for an illegal market, most of the successes have been in developing measures of demand and the harms associated with consumption. The contributions made by the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) in the development of accurate and standardised information across the 27 Member States stand out as exemplary and essential. The data that they compile provides policymakers with invaluable information that can be used to evaluate the effectiveness of a plethora of policies and programmes intended to reduce drug use and related harms throughout Europe.

The development of measures capturing dimensions of the supply of different illicit substances has been considerably slower, but is now an emerging field in the EU. Although various law enforcement agencies frequently report information on seizures, arrests and, less frequently, on purity and price, current data collection efforts are insufficient to support careful analyses of these markets in a manner that would enable us to understand the effect of specific supply-side strategies. To improve these efforts we make the following recommendations (in addition to those posed at the end of Chapter 3):

- Commission the EMCDDA to streamline the data reporting requirements for Member States. It is clear from our conversations and meetings with policy experts that there is a lot of overlap in the data reporting requirements for MSs to local, national, and international organisations, especially with respect to seizures and precursor substances. If this process could be streamlined it may free up time and resources for MSs to entertain new data collection efforts. Given its infrastructure and experience in this field, the EMCDDA is well-positioned and equipped to identify these overlaps and streamline these processes. With respect to precursors, the EMCDDA should work closely with the EU Working Group on Drugs Precursors.

- <u>Create a formal network of researchers, law enforcement officials, forensic scientists and policymakers to regularly discuss advances and challenges in evaluating supply-side enforcement strategies and creating a pan-European database with detailed information about drug seizures.</u> For purity-adjusted prices data to advance understanding of supply-reduction and crime, they will have to be collected for an extended period of time so that trends can be detected and statistically analysed. To maintain interest in these efforts and build the relationships necessary for exchanging data, it would be useful to organise annual or bi-annual meetings. These meeting would bring together members of this network, including those who provide and collect these data in each Member State (e.g. forensic scientists; those at the MS focal points who report price information to the EMCDDA), representatives from the Regional Intelligence Liaison Office of the World Customs Organization who analyse data from the Pompidou Group's Airports Group, and experts from the EMCDDA, Europol, European Commission, and other institutions. Since the EMCDDA, as well as other European institutions, have working groups and ongoing activities related to some supply-side issues, it will be critical to make sure that this network does not duplicate previous or existing efforts. In fact, one of the goals of this network can be to regularly identify all of the groups and activities in Europe related to collecting information about the supply side of the market to help reduce redundancies and maximize resources.

- <u>Combine forensic lab and police case info in a way that allows operational analysis (by police) and strategic analysis (by police and policy analysts).</u> Based on the insights gained from our meeting with policy experts, some law enforcement agencies do not keep detailed information about the circumstances of individual seizures in a computer database – including purity information that is returned from the labs. Since our survey revealed that many labs already maintain databases of all samples analysed, it might be possible to build these databases to retain more useful information about seizures for analytic purposes. For example, law enforcement agencies could be asked to submit a simple information sheet pertaining to the circumstances of the seizure (date, location, time of day, weight, method of detection, type of container, number of people involved, other substances present, and whether this was a targeted investigation) when they send the sample to the lab. This information could then be entered into a database in the lab along with the purity results. While law enforcement agencies may be limited with respect to the information that they can actually share with the labs, basic information such as the total weight of the seizure, where it was obtained (e.g. airport), and whether this was a targeted investigation would be useful. This effort would likely require a formal agreement between the law enforcement agencies and the labs, especially with respect to which institution(s) would be able to access these data and use them for analytic purposes. Finally, the labs would need to be compensated for collecting and distributing these data.

- <u>Recommend to Member States that they consider reporting information about seizures to the EMCDDA by 'weight bins'.</u> An important point made in this report is that information about the total number of seizures and the total grams seized is of limited value for understanding changes in drug markets and supply-side interventions. At a minimum, it would be useful to also include information about the median weight

seized. This way it will be possible to determine whether a few large seizures are having a large effect on the statistics. It would be preferable if information about the total number, total weight, median weight (and purity if possible) was reported for transactions at different levels of the market. The 'weight bins' (e.g. less than or equal to 1 gram, between 1 and 10 grams, between 10 and 200 grams, more than 200 grams) that generally capture the retail, mid-level retail and wholesale transactions will likely differ by country and substance. But reporting information for these bins will allow law enforcement officials to learn more about whether certain activities are influencing the distribution in typical trades made in the market. At the aggregate level, it is more difficult to detect changes in the size of transactions over time.

- Create a pan-European database with detailed information about specific seizures in Europe. The creation of such a database could improve understanding of trans-European drug flows, and their response to Member States and coordinated policy initiatives. While it would be ideal to capture information about every seizure, a programme such as the UK's Project Endorse is probably more realistic. This programme focuses on collecting detailed information on all seizures over 25 grams. This would be a long-term project as it would require Member States to create these databases, coordinate interoperability, and have an international organisation to link them and regulate who would have access to this information. The first iteration could simply include the information that is currently collected by many of the forensic labs. Combining this with the seizure-level information that is reported to the UNODC by some MSs could be informative. If law enforcement agencies decide to share more information about the seizures with the lab, this information could also be added to the database.

This recommendation, to create a pan-European database with detailed information about specific seizures, is closely related with the harmonisation recommendations made in 2001 by the Council of the European Union.[52] Among other things, the Council recommendations suggested these elements should always be collected for all seizures: Date of seizure, country of seizure (or international waters), type of drug, appearance, amount, price, and purity.[53] There are nearly 20 additional variables included in the key elements section and this does not include all of those considered "additional" elements.

The recommendations were intended to be a guidance document and during our Policy Expert meeting in July 2009, questions were raised about why they were not implemented in most Member States. A report by the UK Home Office (2004) included a chapter on these harmonisation recommendations and noted:

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[52] 12411/1/01 STUP 26. 30 October 2001.

[53] "The first chapter "General information" groups the information framing the seizure (when, where, who, how). The chapter "Seizure" contains information on the seized product itself (nature, characteristics). The particular nature of the trafficking and diversion of precursors calls for specific information, which has been included in this chapter. Some of this data envisages the collection of information on the officially declared trafficking, as oppose to the information mentioned in other chapters (e.g. 'trafficking') relating to the illicit transport of such goods. For each seizure, the details listed in these two chapters have to be collected."

"The EU recommendations appear to have been drawn up without consideration of the amount of resources that might be needed to collect the information centrally. There are likely to be issues of security in making some of the information more widely available; e.g. the method of detection, the use of technical means or resources."

Whether or not this applies to other MSs is an empirical question and understanding these barriers to implementing these 2001 recommendations will need to occur before there can be serious discussion of creating a pan-European database. Thus, we consider this a long-term recommendation.

Finally, it is important to note that the effect of supply reduction efforts in terms of intermediate or final outcome indicators is not the only piece of information policymakers need for making decisions about optimal policy. When trying to alleviate the harms associated with illicit drugs, policymakers should also consider information about what these policies and programs cost. Work has been done in the U.S. examining which general strategies (prevention, treatment, domestic law enforcement, or source country control) are most cost effective at reducing cocaine consumption (Rydell and Everingham, 1994; Caulkins *et al.*, 1999) and in Colombia examining the costs and benefits anti-drug policies under Plan Colombia (Mejía & Restrepo, 2009). We are unaware of similar studies conducted in Europe. When a specific intervention or program has been decided upon as a strategy, then it will be important for the EC to ask MSs to provide information regarding their contribution toward that initiative. Contributions can be made monetarily or through resources (e.g. labour, technology) and the best way for doing this will depend on the specific intervention and all the members involved. The total cost of the intervention or program needs to be considered from the EU perspective if the outcome measure being considered in terms of effectiveness in EU-wide. A full discussion on how to consider the cost of implementing programs and initiatives is beyond the scope of this report (e.g. distinguishing between marginal and average costs). However, we raise these issues to make sure that policymakers consider tracking their expenditure on particular policies, programs, and interventions so that those that are found to be effective can be assessed in terms of their cost-effectiveness as well.

CHAPTER 5 **Indicators for understanding drug-related crime**

Emma Disley, Stijn Hoorens, Priscillia Hunt, Beau Kilmer, Rosalie Liccardo Pacula, Lila Rabinovich and Jennifer Rubin[54]

5.1 Introduction

There is a strong correlation between drug market activity and crime. Most obviously, these activities are typically drug law offences and therefore illegal. However, there are many types of crimes thought to be associated with different stages of the drug supply chain, where the causal relationship is harder to establish. Examples range from international drug-trafficking and the establishment of multinational criminal networks, to minor offenders engaging in income-producing crime to support their drug habits. To understand the crime burden associated with prohibited drugs, we set out to develop a comprehensive definition of drug-related crime on which to build indicators. This chapter outlines the difficulties associated with defining and measuring drug-related crime as well as our approach to these tasks.

We conclude that it is unlikely that a credible, comprehensive and singular measure of drug-related crime can be constructed for and monitored by all Member States. Instead, the focus should be on generating measures that help MSs better understand the overall magnitude of the burden imposed by drug-related crime in their countries. For those who are interested in creating an indicator for drug-related crime at the EU-level, this will also be difficult. It makes most sense to focus on tracking high-level drug-trafficking offences for specific drugs. However, constructing this indicator will take time as 1) many countries do not collect information on drug-specific trafficking offences, 2) there are currently large discrepancies in the drug-trafficking offence data collected by the EMCDDA and Eurostat [see Chapter 4], and 3) it will require more information to be collected about the quantity of drugs involved with these trafficking offences.

The structure of this chapter is as follows. In Section 5.2 we investigate which offences might be considered drug-related and how drug-related offences could be conceptualised, categorised and defined. Based upon this review of the literature, we propose a broad definition of drug-related crime. For a number of reasons outlined in the section, we argue

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[54] Authors are listed alphabetically

that existing approaches to categorising and defining crimes as drug-related could be improved. Based on this definition, we introduce a conceptual framework in Section 5.3 that provides a structure for identifying indicators for drug-related crime. This framework considers each stage of the drug supply chain, how these stages are related to types of crime, and the actors involved.

In Section 5.4 we investigate the data which are currently available in Member States about drug-related crimes, and discuss problems relating to the comparability of national crime statistics. Based upon our investigation of the data available, in section 5.5 we suggest some possible indicators of drug-related crime for Member States.

Section 5.6 addresses two issues which bear upon the reliability and usefulness of our suggested indicators: firstly, the question of how drugs are related to crime and whether there is evidence of a causal connection. Secondly, the question of what proportion of different crimes types can be attributed to drugs. In Section 5.7 we suggest a few approaches to how estimating the proportion of different crime types attributed to drugs could be empirically estimated.

Finally, Section 5.8 synthesises the findings of this chapter, and explains our thoughts about the value of developing a single composite indicator of drug-related crime. We conclude that individual Member States interested in reducing the crime burden associated with illicit drugs should focus their efforts on accurately measuring the causal effect of illicit drug activity on specific types of crimes which are of most interest and concern to that country. But while this information may be useful for Member States, they should consider the opportunity costs associated with developing these attribution factors. This is not an easy task and it may be better to focus analytic resources and data system development on other indicators.

5.2 Previous approaches to thinking about drug-related crime

As explained above, drug-related crime is a difficult concept to define and measure for theoretical and practical reasons. Generally, researchers face three types of problems when they try to define, estimate and quantify the proportion of crime that is drug-related: an attribution problem, an endogeneity problem and a measurement problem. Firstly, it is difficult to define the criterion for an illegal activity to be related to drugs. Many use the prerequisite that the illegal activity would not have occurred in the absence of drugs or would not be considered illegal if it were a licit substance. However, it is not straightforward to establish whether a crime would have been committed in the absence of drugs, as there are substitute commodities (e.g. weapons) that may be used by criminal organisations. Secondly, endogeneity problems occur when, in cases where there is a causal relationship, the direction of this relationship is not clear. In the case of drug-related crime this means that an increase in drug use in a community could be the cause of an increase in crime, but it could also be that crime leads to more drug use. Finally, there are also practical difficulties related to measuring crime associated with drugs. Illegal activities are difficult to measure, for instance, because people may not be willing or able to talk about them.

Despite these difficulties, various contributions have been made to defining drug-related crime. A well-known and widely used model for categorising drug-related crimes is the tripartite framework proposed by Goldstein (1985). It classifies such crimes according to three categories. The:

- psychopharmacological crime (i.e. where crime is induced by the psychological effects of ingesting specific substances)

- economic compulsive crime (i.e. where crime is committed to ultimately acquire specific substances)

- systemic crime (i.e. where crime is related to the illicit drug trade, and is mainly that of violence).

The psychopharmacological category focuses upon the excitable and irritable behaviours that result from short- or long-term use of specific substances (including withdrawal). It posits that individuals may exhibit violent behaviours that they would not perform if they were not using the substance or facing the consequences of withdrawal from the substance. This model also captures crime committed by users due to the effects of illicit substances on mood, judgment, cognitive abilities, or inhibition. Categories of crime typically captured under this heading include physical assault, domestic abuse, child abuse and drugged driving.

The economic compulsive category considers criminal activities that are caused by an individual's need to fund their drug consumption, and therefore typically involves individuals who are already dependent on a substance. There are a range of income-producing crimes that users might engage in which vary in terms of scale and gravity, including theft, identity theft, burglary, fraud, robbery, shoplifting, motor vehicle theft, prostitution and drug selling.

The third category of the framework, systemic crime, refers to the activities that characterise many illicit markets at the retail and higher levels. The interactions between users, producers and distributors in a market without property rights and legal recourse can lead to the use of violence and/or intimidation as a way of ensuring compliance with tacit agreements. Street gangs at the retail level and criminal organisations and cartels at higher levels of the supply chain often engage in escalating acts of aggressive behaviour to intimidate and/or punish individuals who do not comply with their wishes or recognise their territorial boundaries. Crimes typically thought of as systemic crimes include homicide, aggravated assault, intimidating witnesses and manslaughter.

5.2.1 Gaps and omissions in Goldstein's framework

While Goldstein's framework has usefully opened up an understanding of drug-related crime, there are some additional categories that are not adequately covered in the framework. In this section we discuss the other categories that we consider important when developing a comprehensive framework of drug-related crime.

Drug law offences. One type of crime that does not figure in this framework is drug law offences. This exclusion was noted by the EMCDDA (2007) and they added a category of drug law offences to Goldstein's typography in their definition. The justification for creating a distinct new category is simply that these offences would cease to be crimes by

definition if drugs were legalised. Drug cultivation, production, trafficking, sale and, for some countries, possession and consumption, fall into this category. Because of this direct relationship between the illegality of illicit drugs and the illegality of activities involving these illicit drugs, the causal association between the drugs and the violation of drug law offences is unambiguous. This is not the case for the use of illicit drugs in relation to many other offences. While most countries systematically collect and publish data about the prevalence of drug law arrests, they capture a fraction of the actual total number of incidences of offences. This fraction is dependent on the extent of drug law enforcement in Member States.

Victimisation. It is worth noting that previous models of drug-related crime have not specified that some criminal victimisation may be drug related. For example, individuals who are assaulted because their judgment was impaired through drug use (or they seemed like less-resistant victims) would typically fall into the category of psychopharmacological crimes. We think it worth pointing out that drugs may therefore play a part in the likelihood of victimisation as well as drug law offences and the commission of crime. Thus, we are inclined to follow MacCoun *et al.*'s (2003) argument that since the causal mechanisms driving user victimisation are highly specific, victimisation related to drug use should be an additional, separate category in any conceptualisation of the drug-crime relationship. Collapsing user victimisation in with other categories of crimes fails to focus attention upon those specific causal mechanisms. The lack of attention traditionally paid to drug-user victimisation by researchers is exacerbated by the relatively poor data available on victimisation related to intoxication. Victims who were under the influence at the time of the offence may be unwilling to report the case to the police for fear that their own intoxication makes them to some extent culpable and/or because they cannot recall events. Although some surveys do ask if the victim perceived the perpetrator as being under the influence, the vast majority do not inquire as to whether the victim was under the influence of a substance at the time of the event.

Corruption and facilitators. The absence of some crimes in existing frameworks has important consequences in any attempt to understand and measure the relationship between supply-reduction activities, drug supply and drug-related crime. If interested in measuring the effectiveness of drug-supply reduction strategies, it is important to include those types of crimes aimed at reducing the effect (or sabotaging) these strategies. These crimes include forms of corruption which may facilitate drug supply and could involve customs officials and police responsible for controlling boarders, or could involve drug-traffickers giving money to politicians and senior officials in return for being allowed to operate in a country. These types of crimes may not necessarily be committed by consumers or suppliers of drugs, but have an unequivocal relation with the international drug trade.

Corruption may include such behaviour as bribery (use of rewards to pervert the judgement of a person in a position of trust), nepotism (bestowal of patronage by reason of ascriptive relationship rather than merit), or illegal appropriation of public resources for private-regarding uses (Nye, 1976, p. 966). It can be operationally defined as the misuse of entrusted power for private gain (Transparency International, 2006). As to the specific relationship between drugs and corruption, Chepseiuk (1999, p. 45) states there is corruption at 'the highest leaves of government, including heads of state, military leaders,

judges, police chiefs and other officials… particularly [in] nations like Bolivia, Mexico, Burma, Pakistan and Colombia'. The UN states that corruption plays a role in facilitating the movement of drugs internationally, specifically in Afghanistan, Mexico and the countries of West Africa, Central America and the Caribbean. For example, a UN report states that in Mexico 'corruption had allowed drug-traffickers to operate relatively undisturbed' (UN International Narcotics Control Board, 2008, p. 65). Additionally, the UN notes that 'Corruption seriously affects many South American countries and reduces the impact of drug control efforts in the region' (UN International Narcotics Control Board, 2008, p. 74). Stares (1996) lists Peru, Colombia, Haiti and Nigeria as countries where corruption allows drug-trafficking to thrive. Although perhaps not as widespread, drug-corruption is not unknown in North America where police officers and officials have been charged with and found guilty of corruption in relation to drugs (Chepesiuk, 1999).

In relation to Europe, most of the literature focuses upon the generally high levels of corruption in Eastern Europe, particularly in the former Soviet states (OECD, 2008). While little is written specifically about drug-related corruption, a World Bank Diagnostic Survey of Corruption in Romania found that customs administrations were perceived by the public as the most corrupt stage agency (World Bank, 2001). This is important because Romania marks the EU's eastern border and thus has strategic significance. Any corruption among customs officials in that country may facilitate the trafficking of drugs into the EU.

Data from international firm surveys indicate a modest reduction of administrative corruption, generally, in eastern Europe (World Bank, 2006; Knack, 2006). This progress is not homogeneous across the region, however, as new EU members from this region have advanced the most, while the non-EU ex-Soviet states remain the least successful, see (OECD, 2008: 16)). These measures of change and improvement, of course, relate to all forms of corruption, rather than specifically to drug-related corruption.

Further gaps in the available research evidence relate to the extent to which drug-trafficking is facilitated by corruption in Europe (i.e. how much would be prevented if there was no corruption) and, perhaps also, whether the existence of corruption in particular countries causes traffickers to select particular routes or whether the existence of drug-trafficking causes corruption.

Whatever the motivation, given that there are instances in which border patrols and law enforcement officials undermine supply-reduction activities, it is crucial that we aim to conceptualise and measure this criminal activity as well as take account of it in our assessment of the impact of supply-reduction activities. If we do not do so, then we both reduce our ability to accurately estimate levels of drug-related crime, and confound our ability to understand whether supply-reduction activities may be ineffective because they were poorly conceived, poorly executed, or deliberately undermined. We have called this group of potential actors in drug-related crime *facilitators*, because when they break the law by allowing trafficking to persist they are facilitating the illicit drug markets and the drug-related crime we are setting out to measure. The crimes committed by facilitators are largely ignored, even though law enforcement agencies spend a significant amount of effort and resources trying to identify financial institutions assisting with the laundering of drug money, or cargo carriers facilitating the transportation of drugs. While it might be possible to continue expanding Goldstein's tripartite framework to include omitted categories of

crimes, such an approach is likely to still leave much uncovered. What is needed is a broader framework and it is for this reason that, in the following section, we propose a new framework for thinking about drug-related crime.

Before we set out that framework, however, we set out our proposed definition of drug-related crime:

> Any illicit activity that is (at least partially) caused by the production, delivery, acquisition or consumption of drugs.[55]

While on the surface this definition might appear unspecific, it allows us to consider the full range of crimes associated with drug use and drug markets, and thus allows the potential to use data about the frequency of particular crimes as indicators for change in the supply and demand for drugs.

5.3   The RAND framework for thinking about drug-related crime

To facilitate a more comprehensive definition for measuring drug-related crime, we have developed a conceptual framework that considers each stage of the drug supply chain, and the types of crime associated with those stages, as well as the actors involved. This conceptualisation and categorisation of crimes, presented in Figure 5.1, is based broadly on a growing understanding of drug markets and how they operate in particular parts of the world.

'Supply-side' drug-related crime involves the legal and illegal activities carried out in support of the cultivation, processing, manufacture, distribution, transport or delivery of a drug to a market and/or consumer. This would include, in addition to the activities just mentioned, the forgery and falsification of documents; bribery; money laundering; use of coercive force or threat to support the cultivation, production, manufacturing, shipment or delivery of a drug; hiding of product or intermediate products; manufacturing of precursor chemicals or other intermediary products used in the production or manufacturing of drugs; and the shipment/transportation of drugs within a country, region or across international borders. This would also include the violence sometimes associated with acquiring drugs or money, enforcing contracts or collusion, and deterring new suppliers from entering the market. These crimes are especially important to consider when considering advanced models that do not assume perfect competition.

The 'demand-side' drug-related crime comprises activities that either support the acquisition of an illegal substance, support the consumption of illegal substances, or which are caused by the consumption of that drug (both perpetuated crimes and victimisation). This includes, but is not limited to, the purchase of drug paraphernalia, property crime, physical assault, prostitution (where it is illegal) and participation in the sex trade. It also includes activities carried out under the influence of a drug, such as sexual or physical

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[55] It is worth noting that within this definition we may also want to include secondary effects of illicit drug use referred to in the criminology literature as sibling effects and generational effects, because drug use by certain individuals in the present can have effects on and increase risk of criminality in children, brothers and sisters, etc now or in the future as well.

assault, drugged driving, using heavy machinery while drugged, domestic violence, intimate partner violence and child abuse or neglect.

Figure 5.1: RAND Illicit Drug Supply Model, sample of drug-related crimes
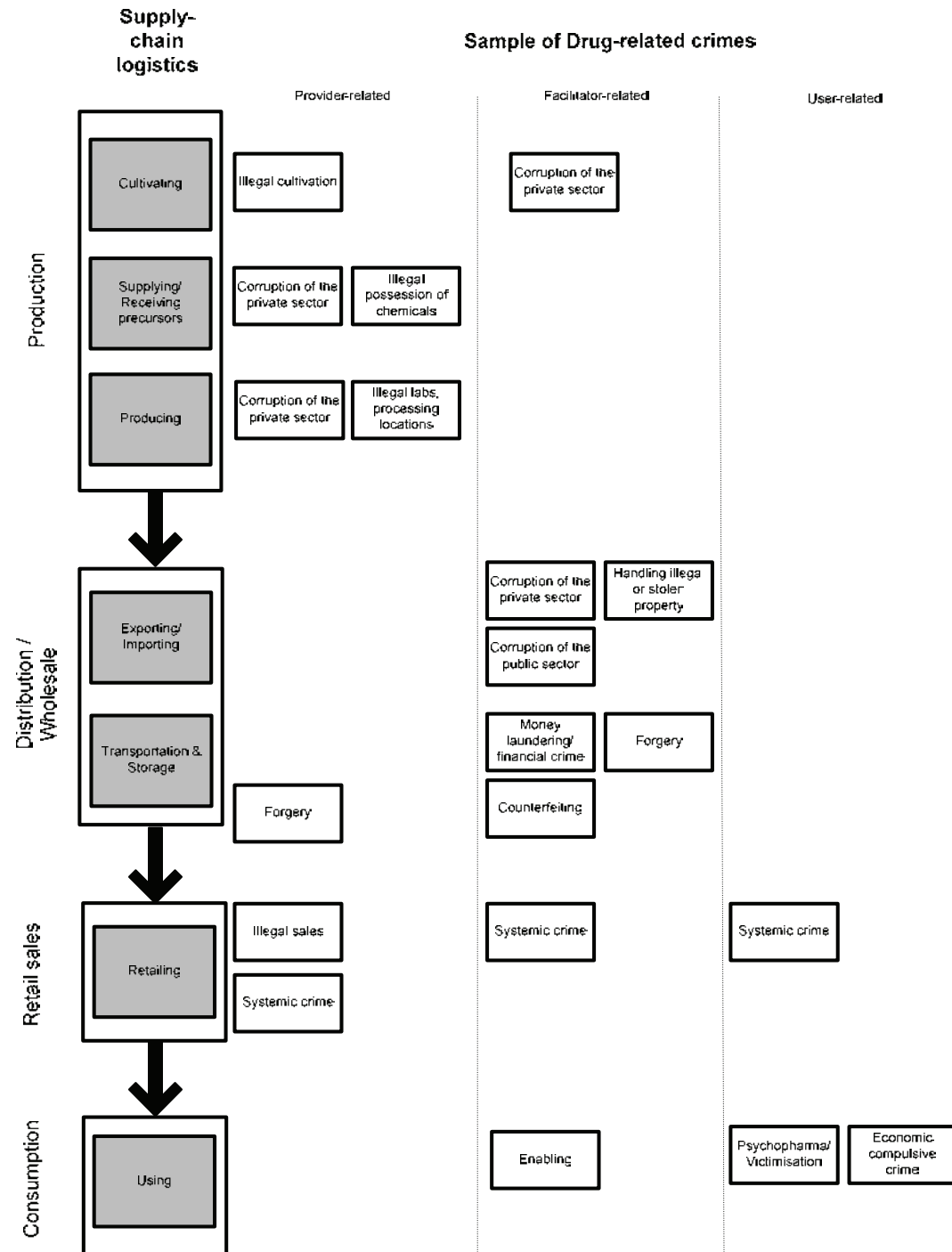
Notes: The grey boxes represent drug law offences. This is not an exhaustive list of the crimes associated with each level of the market and in many cases the crimes listed could be applied to multiple levels of the supply chain. The specific crimes will vary by the type of drug being considered.

As shown in Figure 5.1, we conceptualise criminal agents involved in various stages of the supply distribution chain in terms of providers, facilitators and users. These categories are not necessarily mutually exclusive; they are subject to overlap and are used here primarily as a tool for understanding the ways in which specific types of supply-side crime are tied to particular market activities.

The first group of agents we consider are *providers*, who we define as those involved in the cultivation, processing or production of drugs on any scale. These are the individuals who produce the drugs that are then delivered to various markets either domestically or internationally. Effective law enforcement increases the production cost of providers by destroying crops or increasing the risk that goods do not make it to the market through interdiction and seizures. Intelligence is also effective at times in identifying, prosecuting and incarcerating producers, thereby removing them from the market for a time and reducing their economic viability. Providers take steps to reduce the risk of getting caught and/or losing product, which can involve hiring security personnel, bribing key officials, and enlisting third parties to assist with the transportation and/or storage of product.

The next group of criminal actors in this framework are those discussed in the previous section who we call *facilitators*: those individuals who assist providers at various stages of the supply chain in the movement and delivery of the product to its final retail market. Facilitators also protect the cash payments received from these transactions. Traffickers represent one group of facilitators; another group would include the individuals and organisations involved in the flow of funds or assets exchanged; yet another would be the people who acquire property, transportation vehicles or storage areas. Those people making payoffs to inspectors, law enforcement or other agencies might also be included. All these activities facilitate the 'hidden' flow of drugs. In addition, gangs and criminal organisations that participate in the protection of final markets or trade routes would be part of this group of facilitators. It is important to note that both private and public entities can be 'encouraged' to assist (or to ignore) the transportation of drugs.

The final group of criminal actors are the end-users who engage in drug law offences where consumption is illegal, economic-compulsive crime, psychopharmacological crime or are victimised due to their drug use. It is the crimes associated with this final group of end-users that is most frequently considered and analysed by researchers. This is in large part because more data are available on these types of crimes and because these types of crime are highly visible and more likely to affect members of the public.

RAND has developed this framework to assist in the strategic development of better indicators of drug-related crime. While the framework is useful for identifying and classifying the range of crimes that could be associated with drug supply and drug use, it does not address the critical questions of whether any particular class of crimes are *caused by* drug use, or the *extent to which* particular crime types might be attributed to drugs. We turn to these issues in Section 5.5.

5.4   Drug-related crime data

In this section we look at the data collected in European countries in relation to drugs and crime. We review a number of mechanisms of data collection, in particular, arrestee

surveys, victimisation surveys and criminal justice statistics. In relation to the latter, we discuss the problems encountered when trying to use national criminal justice statistics comparatively.

5.4.1 Sources of information

Arrestee or inmate surveys

Surveys of people in prison or of people who have been arrested provide a useful source of information about the association between drugs and crime, and have been used in a number of countries (e.g. Australia, New Zealand, the UK and US). From these data it is possible to identify the number of arrestees or inmates meeting criteria for abuse or dependence as well as the fraction who engaged in crime while under the influence or committed a crime in order to obtain a drug. Of course, the arrested and inmate populations are not necessarily representative of all criminal offenders and they may not be honest. This limits the extent to which the findings can be generalised, but such surveys still provide considerable insights; both into the drugs-crime nexus, and into the functioning of local drug markets. Arrestee surveys are further discussed in Section 5.7.1.

Victimisation surveys

Victimisation surveys ask members of the public, often householders, about their experience of crime, policing and crime prevention, and feelings of insecurity. Victimisation surveys are therefore able to tell us about offences which are never reported to or recorded by the police. While victimisation surveys conducted within individual countries tend to yield data of sufficient quality, they are rarely comparable between countries. Victimisation surveys which conduct standardised samples in many countries (such as the International Crime Victimisation Survey) can be expensive and time consuming, but provide a reliable and valid cross-national comparison (Lynch 2006).

National criminal justice statistics

Each country in Europe collects some information about the people and crimes which are dealt with by the criminal justice system. National statistics are influenced by a large number of country-specific factors however, including the legal status of certain activities, the way those criminal offences are constructed, the reporting behaviours of the general population and police recording practices. Furthermore, the nature of the criminal justice process will also affect the way statistics related to prosecutions, court proceedings, trial outcomes and sentencing are constructed. All these practices are country-specific and therefore create comparability problems.

Reporting of crime. Not all offences are reported to the police by the public, or come to the attention of the police in some other way. To get a sense of how much crime comes to the attention of the police or other criminal justice authorities, it is useful to compare official statistics with the findings of victimisation surveys. Research suggests that among European countries there is no statistically significant relationship between police-recorded crime rates and actual victimisation rates (Van Dijk *et al.*, 2007; Gruszczynski, 2005; Mayhew, 2003). Such findings led Van Dijk (2008) to argue that:

> Statistics on police-recorded crimes should be used only to inform input indicators of police forces and criminal justice systems [...] they cannot and should not be used to make any statements on the absolute or even relative level of crime in a country or trends in crime.

While it is important to keep in mind the gap between official crime figures and the actual number of crimes, Van Dijk's position is extreme. For important and notable crimes, such as homicide, official statistics might paint a fairly accurate picture of crime levels, since these crimes tend to be reported to and recorded by the police. For 'volume crimes' such as small thefts and non-serious assaults, we can expect official statistics to paint a less accurate picture, since these might be less frequently reported. Thus while official statistics might not provide a robust estimate of the overall number of crimes, if the data are used intelligently they may still provide useful information about the prevalence of some offence types.

National recording practices. Another issue relating to the harmonisation of criminal statistics is the variation in recording practices. The possible stages at which a crime might be recorded include 1) after a crime is reported to police; 2) after the arrest of a suspect; and 3) after conviction. We have already discussed the issues relating to the under-reporting of crime by the general public, which could affect recording at stage (1).

If crime is only recorded once an arrest is made (stage 2) or a conviction is secured (stage 3), this introduces a second filter on official statistics; an arrest will only be made in a proportion of reported offences. Only some of those who are arrested will be charged and prosecuted and only some of those charged will be convicted. The rate of attrition between these stages will depend upon the priorities, resources and effectiveness of police and prosecution agencies and, as Van Dijk (2008) explains, these factors will not only affect attrition rates but might also impact upon the willingness of the public to report offences:

> In some countries, low police figures may [...] reflect extraordinarily poor performance of the police, resulting in a low level of trust among the public, limiting the proportion of crimes reported to the police.

Problems of both under-reporting and under-recording might be compounded in Member States with higher levels of corruption or political instability.

In addition to differences in the stage at which an offence is recorded, there are differences in the recording methodology for multiple offences. The following differences exist in relation to the recording of drug offences[56] by Member States' National Focal Points (REITOX):

* Multiple offences are considered as one if they occur in the same incident.

* Multiple offences are considered as one if there is the same intent.

* Multiple offences are considered as one if there is both the same victim and the same intent.

* It is unclear how multiple offences are recorded.

* 'Other offences'.

The construction of drugs offences across Europe. In Section 5.2, we highlighted EMCDDA's amendment to the Goldstein framework, which included violations of national drug laws as a specific conceptual category of drug-related crime. Yet there are

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[56] Use, possession and trafficking.

significant issues concerning the comparability of data about the prevalence of drug offences, not least because types of activities that are illegal in one Member State can be legal in another. The EMCDDA European Legal Database on Drugs (ELDD) provides information about national laws in relation to consumption, possession and trafficking. Distinctions between legal and illegal activities can be made in national legislation on the basis of a number of factors. These factors, which might affect the decision to record an offence, charge a person and/or to begin a prosecution, may include the:

- quantity

- nature of the substance

- organisation of the individuals

- chain of possession

- intent to sell.

It is also worth bearing in mind that different countries are likely to have a different 'portfolio' of drug activity in a country. For example, are they primarily a 'producer', 'consumer' or 'trafficker' of illicit drugs? The make-up of the portfolio is also likely to change over time. These factors will likely determine how countries measure drug-related crime.

5.4.2 The difficulty of generating a cross-jurisdictional composite indicator

Given the heterogeneity in recording practices, legal systems and drug portfolios, generating an all-encompassing composite indicator of drug-related crime that can be computed and compared among all jurisdictions will be extremely complicated. One approach that has been attempted in the past is to assign a monetary value to each specific crime of interest and then generate the total economic cost of drug-related crime for a jurisdiction. This figure could be denominated by GDP to create a measure that is comparable across countries. This calculation requires an estimation of the cost to society of each individual crime as well as the share of offences that can be attributed to production, trafficking, dealing and consumption of illicit drugs. Calculating the cost of crime is a growing field in the EU (e.g. Bowles' www.costofcrime.org) and new techniques are being generated for other countries (e.g. French *et al.*, under review). However, recent difficulties faced by researchers who simply attempted to compare the criminal justice costs associated with drug law offences in seven developed countries suggest that it will be a long time before Member States will be able to generate comparable cost estimates (Pacula *et al.*, 2009). We therefore acknowledge that a composite indicator of drug-related crime would be preferable from a methodological perspective; however, we conclude that data collection mechanisms are currently not equipped to facilitate the construction of such an indicator.

5.4.3 Data available at European and international levels

Despite the methodological difficulties, there are is variety of data collection systems containing information on drug-related crime. Appendix B presents a summary of the key systems currently available at the international and European levels. Agencies such as Europol, Eurojust and UNODC publish reports providing information on crime trends and patterns. Information made available by such international agencies on drug-related crime is typically about distribution and wholesale; for example, trafficking data.

Extensive information is available from Eurostat and the European Sourcebook. Criminal justice statistics on drug law offences are made available for each country through EMCDDA. These statistics reflect the number of offences and offenders convicted of violating drug laws in terms of use, possession and trafficking.[57] However, it is important to note that there are important discrepancies between the EMCDDA and Eurostat drug-trafficking figures, as we highlight in Table 4.4.

Within individual countries, law enforcement agencies hold more detailed information than is reported in international data sets. Such information is often highly sensitive intelligence information sourced from informants, undercover officers, and so on, which cannot be disclosed.

5.5   Possible indicators of drug-related crime

Based on the conceptual framework introduced earlier in this chapter, we discuss some dimensions that are worth considering when developing indicators of drug-related crime in this section. We then set out and discuss the merits of two alternative types of indicators. Lastly, we provide a list of possible indicators, and attach some caveats to their use.

5.5.1   Dimensions to consider when developing indicators of drug-related crime

In this report we aim to propose indicators for measuring drug-related crime and the effectiveness of drug supply measures. To be considered suitable for recommendation, indicators should fulfil three main criteria: they must be analytically feasible, politically acceptable and practically feasible. On the one hand, indicators should be analytically robust: they should be reliable proxies for the variables of interest and thus measure crime levels attributed to different stages of the drugs supply chain. For example, the number of drug-use offences as a proportion of total offences may be an attractive indicator from a political perspective. If all other offences increase, it can appear as though drug offences are reducing, which could create an impression that policy has been effectively reducing drug-related crime. From an analytical perspective, this is not an ideal indicator since it is not representative of actual drug-related crime.

On the other hand, data collection should be practically feasible, and indicators should be politically acceptable. For example, it may be operationally unfeasible to implement mandatory drug testing that would be enormously useful in understanding prevalence in some populations. But even if there are analytically robust indicators that, as in the case of drug-related crime indicators, have practical difficulties with data collection, they may offer a starting point from which considerations of feasibility can then be applied. As discussed, the biggest practical challenge to an ideal indicator stems from the problems relating to the acquisition of representative, reliable data from different countries. Taking these data issues into account forces us to consider what is operationally feasible.

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[57] There is some break down by type of drug in these statistics. For drug law offences EMCDDA separates out the percentage of reports for drug law offences in which different kinds of drug are involved: http://www.emcdda.europa.eu/stats09/dlotab3a. There are also data for cannabis-related offences, heroin-related offences and cocaine-related offences.

5.5.2 Options for indicators

As indicated in Figure 5.1, there are a number of crimes which are possibly drug-related and which might, therefore, be used as indicators as to the level of drug-related crime. Previous attention has been given to offences associated with prohibition (e.g. possession and sales); generating revenue to obtain drugs (e.g. property crime, prostitution); and violence among dealers. Our framework suggests a further broadening of this typology and also considers offences associated with the other levels of the supply chain as possible indicators (see the framework in Figure 5.1). For example, bribery, document forgery, money laundering, and extortion associated with drug-trafficking could all be considered as potential indicators.

Table 5.1 lists examples of crimes that could be causally attributed to illicit drugs, presented by the type of actor involved: user, provider and facilitator. These lists are lengthy, but not exhaustive, and are meant to highlight that Member States have many options to consider when thinking about how they want to measure drug-related crime.

Table 5.1: Examples of crimes committed by different actors

Examples of crimes committed by drug users	Examples of crimes that could be committed by providers/suppliers	Examples of crimes that could be committed by facilitators or providers/suppliers
• Physical assault w/o weapon • Physical assault w/ weapon • Sexual assault / rape • Domestic violence • Homicide • Drugged driving • Child abuse or endangerment • Vandalism • Public disturbance or disorderly conduct • Prescription law violations • Simple drug possession arrest (where illegal) • Simple drug use arrest (where illegal) • Simple drug paraphernalia possession arrests (where illegal) • Motor vehicle theft • Petty theft • Larceny • Identity theft • Burglary • Robbery • Mugging • Prostitution (where illegal)*	• Illegal cultivation • Diversion from legal cultivation • Illegal production • Diversion from legal activities (chemicals, people, equipment) • Illegal use of precursors • Environmental (criminal) damage • Theft of machinery, chemicals or physical plants	• Corruption of the private sector • Corruption of government to ignore cultivation • Intimidation / security for illegal cultivation • Illegal storage • Forgery • Counterfeiting • Bribery • Receiving/handling stolen or illegal property • Trade fraud • Forgery • Counterfeiting • Bribery or corruption of officials • Money laundering/financing

While Section 5.7 discusses how Member States can estimate the share of these crimes attributable to illicit drug use, production and trafficking, there are two types of crimes we want to highlight: drugged driving and the diversion of legally imported/produced precursors.

Drugged driving. Across the EU, data collection about drugged driving is becoming increasingly prevalent, and there is a European-wide data effort that could be drawn upon: the DRUID project (Driving under the Influence of Drugs, Alcohol and Medicines). This

is an EU-funded project investigating the impact of alcohol, illicit drugs and medicines upon fitness to drive. This project will analyse the prevalence of alcohol and other psychoactive substances in drivers involved in accidents and in the general driving population.[58] If it becomes routine to test obviously intoxicated drivers for illicit drug consumption (in addition to alcohol), a potentially useful indicator could be arrived at by dividing the number of drugged driving cases by the number of vehicle kilometres travelled (similar to that used to denominate alcohol-related fatalities to account for the fact that driving is more common in some countries). Another possible numerator would be drug-involved traffic fatalities. Of course, both of these measures will likely be complicated by the fact that alcohol or multiple drugs could be involved. Close attention should also be paid to the reliability of the drug testing technology and its ability to detect very recent use.

Additional caveats that must accompany the use of drugged driving data as an indicator are the need to account for differences in the minimum driving age in different Member States, as well as the fact that figures will be influenced by the state of national transport infrastructures and how expensive cars and petrol are. Another current limitation is that DRUID will not be completed until 2010, and at the moment it is only operating in certain countries. However, collection of data about drugged driving is well beyond proof of concept and it could be a highly useful source of data.

Diversion of legally imported/produced precursors. Some illicit drugs require specific precursor substances for their manufacture. As explained in Chapter 4, calculating a diversion rate would serve as a useful indicator for understanding the effectiveness of supply-reduction activity. It would however also be a useful indicator for understanding the amount of crime at the upper-levels of the supply chain in the EU. But as noted in Chapter 4, there are difficulties associated with obtaining information about precursor import and usage from private companies. Thus, it is difficult to know how much is actually being diverted at the EU level.

5.6 The nature of the association between drugs and crime: A review of the literature

The previous section listed a number of crimes that might be used as indicators of drug-related crime. However, they will not be reliable indicators unless we can find out what share of a specific crime is actually attributable to illicit drugs.

Whilst this task is easy if one only considers drug possession and sales offences, as explained in Section 5.5, we would like to use other crimes that are correlated with drug use as indicators. So, for example, fraud and forgery occur for reasons other than those related to drug markets, and if drugs are involved in only a small number of the reported fraud cases then changes in the number of frauds might not be a terribly useful indicator of the extent to which drugs are generating harm. It is possible that some crimes are highly

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[58] A forthcoming DRUID deliverable is *Prevalence of alcohol and other psychoactive substances in drivers in traffic in general in 13 member states*, to be published by SWOV – Institute for Road Safety Research, Netherlands. http://www.druid-project.eu/cln_007/nn_111632/Druid/EN/deliverales-list/deliverables-list-node.html?__nnn=true

correlated with the demand and/or supply of drugs, which would, therefore, be good indicators. A possible example would be drugged driving. Strategically, it is important to understand which crimes are highly associated with drug markets, as well as how they are related to those markets. Therefore in this section, we conduct a brief review of the literature into the association between drugs and criminal behaviour, much of which focuses on crimes related to the end-user. As discussed below, the available research finds a clear association between drug use and criminality, but the extent to which these crimes can be considered to be causally associated with drugs has not been established.

5.6.1 Drug use might coincide with offending without being causal

There is strong evidence from several countries that arrestees use drugs at a higher frequency than people in the general population (Taylor and Bennett 1999; Makkai *et al.,* 2000). But just because arrestees test positive for drugs or admit to being under the influence of drugs at the time of the offence does not mean that it was the drugs that caused the crime. Indeed, 56 percent of respondents in the UK Arrestee Survey who were high when they committed an offence reported that they would have committed all or some of their crimes even if they were not high (Boreham 2007).

A large number of unobserved common factors could generate a positive association between drug use and crime regardless of a true causal connection, such as personal characteristics of individuals that motivate them to become involved in both behaviours (Hirschi and Gottfredson, 1988; Fagan, 1990; White 1990). Factors that have been hypothesised to generate the association between crime and drugs include gang involvement (Fagan, 1990); peer effects (Gorman and White, 1995); general problem behaviour during adolescence (Jessor and Jessor, 1977); and common environments or situational causes (Skogan, 1990; Fagan, 1993). There is evidence that substance use and delinquent behaviour share many common causes or predictors. For example, many of the childhood risk factors for violence (such as hyperactivity, impulsiveness, risk taking, early school failure, peer rejection and an inability to delay gratification) have been identified as risk factors for teenage and adult drug use (Hawkins, Catalano, and Miller, 1992; Brook, Whiteman and Cohen, 1995).

5.6.2 Findings from research which controls for unobserved factors

To attempt to unpack the nature of the relationship between drugs and crime we can turn to longitudinal analyses which have accounted for some of the typically unobserved factors. This research provides some compelling support for a causal interpretation. For example, in a study of 10,441 secondary students in New South Wales, Australia, Baker (1998) found that frequent marijuana users were almost five times more likely to report participation in acquisitive property crime than non-users. The analyses controlled for parental supervision, family structure, school performance, truancy, and other alcohol and substance use.

In a similar longitudinal analysis of a New Zealand birth cohort, Fergusson and Horwood (1997) looked at the effect of adolescent marijuana use upon four measures of delinquency (the commission of three or more violent offences; the commission of three or more property offences; being arrested by the police; or having a conviction for an offence in court). They found a positive relationship between each of these outcomes and frequency of marijuana use by age 16. This persisted after adjustment for covariates, suggesting that it

was not wholly explained by the characteristics of adolescents who become regular marijuana users by age 16. It also persisted after adjustment for drug use and criminal behaviour in the user's peer group, indicating that it was not explained by affiliating with delinquent and drug-using peers.

There is mixed evidence with respect to a causal connection between drugs and crime from the economics literature, where sophisticated econometric techniques have been employed to deal with statistical problems caused by reverse causality and unobserved third factors (Grogger and Willis, 1998; Corman and Mocan, 2000; DeSimone, 2001; Markowitz, 2005). For example, DeSimone (2001) used time series data on crime rates for the period 1981 to 1995 in 29 large cities for which he also had data on the price of cocaine. Using a 'two stage least squares' techniques that reduces the potential for correlation with the error term, DeSimone (2001) found that lower cocaine prices (indicative of higher levels of cocaine use) are associated with higher rates of six index crimes (murder, rape, robbery, burglary, larceny and motor vehicle theft). The findings are consistent with findings from Grogger and Willis (1998) using data from the 1980s, and Markowitz (2005) who used data from the 1990s.

However, the evidence from economic studies is not uniformly consistent. In an analysis of monthly crime rates in the 58 counties of California, Dobkins and Nicosia (2009) failed to find a statistically significant association between methamphetamine use, cocaine use, opioids use and cannabis use and any of the index crimes. The findings are significant in light of the fact that they considered data during a period when shocks in the methamphetamine market were clearly showing huge effects on drug treatment episodes and methamphetamine prices. Similar findings, with respect to methamphetamine at least, were shown in some cross-sectional state analyses as well (Nicosia *et al.*, 2009).

Some consider evidence of reduced criminal involvement following effective drug treatment as evidence of a connection between drugs and crime (Bennett and Wright, 1986; Jarvis and Parker, 1990; Parker and Kirby, 1996; Gossop, 1998; Zarkin *et al.*, 2000; Jofre-Bonet and Sindelar, 2002). Research indicates that drug treatment of various types reduces recidivism, suggesting the reductions in drug use reduce user-initiated crime. In one study, Jofre-Bonet and Sindelar (2002) estimate that the reduced drug use due to treatment is associated with 54 percent fewer days of crime. However, Seddon (2000, 2006) points out that the links may have something to do with social inclusion following treatment rather than the reduction in drug use itself. Seddon (2000) suggests that reducing social exclusion is a more effective means than improving access to treatment in order to reduce the drug-related crime of users. This is further supported by research testing theories of criminal behaviour and drug use, which finds that as individuals mature, earlier drug problems increase the likelihood of criminality and earlier criminal activity increases reporting of drug problems (Newcomb *et al.,* 2001). There is also the possibility of a selection effect – that those drug users who enter and stay in treatment are also more likely to desist from crime, compared to users who do not enter treatment.

5.7   Generating attribution factors

The following mechanisms can be used to estimate the share of a specific crime that is actually attributable to elicit drugs:

1. Obtain information from people who commit crimes, using surveys of offenders and inmates, and then extrapolate.

2. Obtain information from the police or victims, by adding fields to police reports or adding questions to victimisation surveys.

3. Conduct statistical analyses of aggregated crime data.

5.7.1 Arrestee or inmate surveys

One method for determining which crimes are related to substance consumption is simply to ask a sample of offenders (e.g. arrestees, inmates). This approach will, of course, have biases associated with it, because it only focuses on those who get caught or imprisoned. The prevalence of drug use among arrestees is many times that of the general population, and of the offending population. However, arrestee surveys can provide a rich source of data about drugs and crime, since we can ask specific questions about the role of substance abuse in their decision to commit crime, including questions about whether the crime was committed in order to obtain drugs; whether the individual was under the influence at the time of the offence; and whether they would have committed the crime for which they were arrested if they had not been under the influence at the time of the offence. Directly asking an arrestee about the relationship between their drug taking and criminal activity is a simple and direct way to generate attribution factors for particular drugs and particular crimes.

There are important drawbacks to implementing arrestee surveys besides sample bias. They can be expensive[59] and there are often important implementation issues. Experiences in the UK (see Chapter 6) have shown that arrestee surveys are associated with a number of practical limitations. These surveys have typically low response rates resulting from various practical issues surrounding the interview process. Some of these issues include: availability of interview rooms, availability of police officers to escort arrestees from cells to place of interview, guaranteeing the safety of interviewers, and time constraints. Additionally, it is difficult to interview individuals who are still intoxicated when they enter the jail. The combination of these factors results in a low response rate and subsequent selection bias for arrestees willing to cooperate.

On the other hand, arrestee surveys have a number of wider benefits, beyond improving our understanding of drug-related crime.

- We can learn about the drug use patterns for certain types of offenders.

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[59] At the Scientific Expert meeting it was suggested that it costs two to three times more to interview an arrestee in the UK than someone in the general population for the British Crime Survey. However, this ratio may not be uniform across the EU. For example, in 2003 in the US, the Arrestee Drug Abuse Monitoring (ADAM) survey cost around $12m with 26,630 completed surveys and about 90% as many drug tests. The US National Household Survey on Drug Use and Health (NSDUH) costs about $50m to operate and included 67,784 completed surveys in 2003. Based on these figures, ADAM costs less than $500 per completed survey while the large general population survey costs over $700 per completed survey. While these figures suggest that it may be cheaper to interview arrestees about drug use than those in the household population, direct comparisons are difficult since the survey instruments were different, technologies were different, and the NSDUH was trying to include a nationally representative sample, while ADAM only focused on approximately 40 jurisdictions.

- We can obtain information about the raw price paid for drugs during an arrestee's last purchase.

- Arrestee surveys conducted in the US, Australia and New Zealand (and, until recently, the UK) include a wealth of questions about previous criminal history, treatment utilisation, income and more.

- Many surveys include voluntary drug tests at the end, so researchers can assess the level of misreporting among arrestees.

- Arrestee surveys can be used to learn more about how illegal drug markets work in different jurisdictions.

In relation to this last point, Table 5.2 compares how drugs are obtained in New Zealand and Australia using information from their arrestee surveys. This information is especially important for law enforcement officials seeking to develop strategies to disrupt retail markets. For the arrestees covered by these surveys, most heroin transactions in New Zealand occur in a private residence whereas in Australia they mostly occur on the street. This is useful information to have when deciding where to place informants and where to allocate scarce enforcement resources. This information can also be used as an indicator to determine whether enforcement strategies have created changes in the market. Of course, that requires collecting this information over time, and preferably in quarterly or monthly intervals.

Table 5.2 How drugs are acquired, according to arrestee surveys from Australia (DUMA) and New Zealand (NZ-ADAM) (percentages)

	Cannabis		Heroin		Amphetamines	
	NZ-ADAM	DUMA	NZ-ADAM	DUMA	NZ-ADAM	DUMA
Method of contact						
Mobile phone	18	20	40	42	34	31
Landline phone	2	12	0	24	2	20
Visit a house or flat	57	37	33	11	27	26
Approach them in public	8	8	14	7	14	10
Place of purchase						
House or flat	46	60	60	26	56	53
On the street	11	22	7	55	15	29
Delivered to individual	11	11	7	11	12	10

Source: Hales and Manser (2007). Columns do not add up to 100 percent since some categories were excluded because of discrepancies between the surveys.

Additionally, there are ways of minimising costs for specific agencies while still providing valuable insights. For example, arrestee surveys can be developed to have rotating modules where some questions can be asked every quarter, some can be asked annually, and others can be asked only once (RAND, 1999). The UK Arrestee Survey experimented with rotating modules before it was cancelled in 2007.[60] It is important to note that questions for these modules do not have to be limited to drug use and crime. In fact, generating interest and questions from other agencies that are interested in this population (e.g.

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[60] For more information about the UK Arrestee Survey, see Chapter 6.

mental health providers, employment agencies) could improve the usefulness of the study and increase the number of agencies willing to partially fund the survey.

For those Member States interested in learning more about the use patterns and drug market activities of heavy drug users who account for most consumption, consideration should be given to augmenting or adding new surveys to their portfolios. In cases when MSs already survey these populations, they should consider adding questions about the relationships between consumption of illicit substances and crimes conducted or victimisation. In some countries it makes sense to target arrestees, while in others it may make more sense to focus on those entering treatment or convenience samples of heavy users. However, if MSs assign priority to estimating the share of crime that is attributable to drugs, they should seriously consider arrestee and inmate surveys. If the surveys will primarily be used to learn about crime, MSs may be able to obtain useful information by conducting the survey every second or third year.

5.7.2 Adding fields to police records

An alternative or complement to offender surveys would be to add a field to police reports where officers and other investigators could indicate whether or not they thought the offence was drug- or alcohol-related. An example of an agency that does this is the Probation and Mediation Service in the Czech Republic (See Section 6.2.7).

In Section 5.5 above, we pointed out that it is difficult to generate indicators about crime at the upper levels of the supply chain, such as forgery or bribery. These crimes are important but are committed at a low frequency. Due to the nature of these crimes, and because of their relatively low frequency, it is unlikely that people committing these types of crimes will feature in the arrestee population frequently enough for information about such crimes to be collected through arrestee surveys. Therefore we recommend that countries who are interested in these offences should consider amending investigative reports to include a field which asks the officer whether they believe the offence was drug-related.

5.7.3 Statistical analysis of aggregated crime data

Regression models can be used to determine whether changes in consumption correspond with changes in crime or victimisation rates while accounting for several other community-level factors that may also influence crime. The problem with generating attribution factors using this method is that while it is relatively easy to obtain high-frequency crime data at sub-national levels, it is much more difficult to obtain sub-national information on drug use and victimisation.

Additionally, there is an endogeneity issue with respect to crime and drugs. In other words, it is not clear if an increase in drug use in a community leads to more crime or vice versa. If advanced statistical techniques are not used to address this possibility, the resulting analysis may yield biased estimates of the effect of drug use on crime. In cases like this, researchers seek alternative variables (instrumental variables) that are correlated with drug use but not crime (Angrist, Imbens and Rubin, 1996). For property crime, purity-adjusted price is a plausible instrument, but it is less so for violent crime since changes in drug prices could generate violence among competing gangs. Drug laws are also used but this assumes that proxies for expected sanction influence consumption. This may not be the case in all Member States and is an important empirical question.

5.8   Conclusions

Drug-related crime encompasses violations associated with prohibition and any illicit activity caused by consumption or participation in the supply of these prohibited substances. Thus, it is useful to think about this construct in terms of drug law *offences* and the *consequences* of drug consumption (e.g. acquisitive crime) and drug-trafficking (e.g. corruption). While it is important to make sure that definitions of drug-related crime are not too exclusive (e.g. it should include the corruption that is often caused by the trafficking organisation), the focus should be to generate measures that help us better understand the magnitude of the burden imposed by drug-related crime.

To better understand the crime burden associated with prohibited drugs, we developed a model that considers each stage of the drug supply chain, how each is related to types of crime and the actors involved. The conceptualisation and categorisation of crimes presented in Figure 5.1 are based broadly on a growing understanding of drug markets and how they operate in particular parts of the world. A simple examination of this conceptual framework provides insights into the difficulties of trying to construct indicators of drug-related crime in any jurisdiction. While much attention is given to offences associated with prohibition (e.g. possession and sales offences), those associated with generating revenue to obtain drugs (e.g. property crime, prostitution) and violence among dealers, there are a number of offences associated with the different levels of the supply chain (e.g. diversion of legal precursors, bribery, corruption of law enforcement) that also need to be considered and are not nearly as well understood. Furthermore, countries will have different portfolios of drug-related crimes and there could be changes in criminal activities within countries over time. One approach for constructing this indicator is to place a monetary value on specific crimes and then generate the economic cost of drug-related crime for a jurisdiction. This figure could be denominated by gross domestic product (GDP) to create a measure that is comparable across jurisdictions.

While development of a composite measure of drug-related crime may be appealing, there are at least two reasons why this approach is difficult to implement. Firstly, calculating the cost of specific crimes to society and the share of offences that can be attributed to drug production, trafficking or consumption are non-trivial tasks. Calculating the cost of crime is a growing field in the EU and new techniques are being generated for other countries. However, it is very difficult to estimate the criminal justice costs associated with drug law offences. Thus, we expect that it will take a long time before Member States will be able to generate comparable cost estimates of these costs. Secondly, it is unrealistic to think that a singular measure of drug-related crime can be consistently constructed and monitored for all Member States for the simple reason that not all have the same legal definitions of criminal behaviour. Two relevant examples in the case of illicit drugs are drug possession offences (which is not a criminal offence in Portugal, Spain and Italy) and prostitution. Hence, monitoring these behaviours in a consistent fashion across countries would be extremely difficult.

Instead, the focus should be to generate measures that help MSs better understand the overall magnitude of the burden imposed by drug-related crime; however, the costs associated with calculating drug-related crime must be weighed against the possible benefits from other types of analysis. Since precisely estimating the share of a particular

crime that is attributable to drugs (besides offences related to prohibition) can be difficult even with good information, we suggest MSs focus on those crimes that are of greatest interest because of their social harm. Multiple methods can be used to generate a lower- and upper-boundary estimate of costs associated with this type of crime. [61]

Attempts to generate comparable EU-level indicators for drug-related crime will likely have to focus on drug law offences. Knowing how the number of high-level trafficking arrests for a specific drug changes over time in a particular region can be useful for understanding changes in trafficking routes as well as the effectiveness of MS and multinational interventions. While some countries do collect information on drug-specific trafficking offences, many do not. Another issue surrounding drug-trafficking offences is that there are noticeable differences between the EMCDDA and Eurostat estimates and the differences are inconsistent across countries. Finally, as noted in the seizure discussion in Chapter 4, it is difficult to interpret changes in arrest rates over time without the appropriate denominator (e.g. enforcement spending, number of police officers). That being said, if there remains pressure on the EC to collect information about drug-related crime, this seems like a logical starting point.

Based on these insights we offer the following recommendations:

- Recommend to Member States that they decide whether they want to measure drug-related crime in their country, and if so, which crimes. To understand the true burden associated with illicit drugs, it is necessary to understand the extent to which drugs *cause* crime. There are several types of offences that can be considered when attempting to measure the level of drug-related crime in a jurisdiction. While much attention is given to offences associated with prohibition (e.g. possession and sales), those associated with generating revenue to obtain drugs (e.g. property crime, prostitution) and violence among dealers, there are a number of offences associated with the different levels of the supply chain. Bribery, document forgery, money laundering and extortion associated with drug-trafficking are also types of drug-related crime that could be considered. The level of drug activity in a country (e.g. are they primarily a 'consumer' or 'trafficker' of illicit drugs?), will likely determine the types of crime considered and the subsequent methods required to measure this relationship. While this information may be useful for Member States, they should consider the opportunity costs associated with developing these attribution factors. This is not an easy task and it may be better to focus analytic resources and data system development on other indicators.

- At the EU level, standardise definitions of drug-trafficking offences, then involve MSs in tracking these offences for specific drugs. The EMCDDA collects arrest information from the National Focal Points by type of drug and type of offence (i.e., possession and sales), but not jointly. Thus the Statistical Bulletin cannot be used, for example, to track how cocaine trafficking arrests have changed over time. Making international comparisons is also difficult since MSs report different types of trafficking information to the EMCDDA (e.g. arrests, convictions). Making intranational comparisons is

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[61] For another approach to creating such lower–upper boundary ranges, see Nicosia *et al. (*2009).

complicated by the fact that MSs report different information about the number of trafficking offences to the EMCDDA and Eurostat. There are large differences between these estimates and they are not consistent across countries. It will take significant resources and efforts to agree on common definitions and incorporate them into practice. Fortunately, there is a lot of discussion in Europe about harmonising criminal justice data systems (e.g. DG JLS), not just related to drugs. As these data collection efforts advance, it will be critical to make sure they include fields for specific drugs and specific offences. Additionally, these new data systems should include fields that allow law enforcement officers to estimate the weight of the drugs obtained (similar to that which is being done in the US with the new National Incidence-Based Reporting System).

- Collect systematic data about what happens after someone is arrested for a drug offence or commits a drug violation while on probation. While arrests for drug possession and sales are important for assessing the costs associated with drug-related crime, this is only one aspect of the costs. The costs generated after arrest, such as adjudication and incarceration, should also be included if one wants to better understand the costs associated with these types of crimes. This information is also important for understanding the expected sanction associated with these types of offences. While studies about the general deterrent effect of expected sanctions for drug offences are notoriously mixed, there is emerging evidence that swift, certain and small sanctions for probationers who test positive for drugs or miss an appointment can have a strong specific deterrent threat (Kleiman and Hawken, 2008). For analyses of different legal regimes or probation practices, it is important to focus on the probabilities of detection and punishment as well as type of sanction typically imposed. Even in countries with good data systems, information about what happens after a drug violation is hard to obtain. Thus, this task will likely pose a special challenge for those countries with less-developed data systems. While part of this is simply a resource issue, there may also be local barriers with respect to tracking arrestees and probationers through the system that will have to be considered. [62]

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[62] As this report goes to press, the EMCDDA is about to release a Selected Issue of sanctions for drug offences. This will be a strong contribution to the field and it should make it easier for analysts to understand what happens after someone is convicted of a drug arrest.

Insights from three case studies

Stijn Hoorens, Susan Kirk, Lila Rabinovich and Emma Disley

In this chapter we present the results of three case studies into the policy needs for data collection, reporting and use in the field of drugs-supply reduction and drug-related crime for a small sample of EU Member States: the United Kingdom, Czech Republic and Spain. These case studies have been selected in consultation with the European Commission, DG JLS. These countries have been selected on the basis of their supply-chain position in the European illicit drug markets and our assumptions about their experience with certain types of data collection (see Table 6.1).

Table 6.1. Rationale of case study selection

	United Kingdom	Czech Republic	Spain
Supply chain position	Primarily consumer market	Consumer market for most substances	Consumer market for most substances
		Production of Methamphetamines	European entry port for cocaine and cannabis
Particular data collection experience of interest	Arrestee surveys (e.g. NEW-ADAM)	Monitoring of sales of licit precursors	Seizures

The goal of these country case studies is to better understand the data collection processes (sampling, reporting, collection and use), their unique features, strengths and potential limitations in these Member States. They should also provide insight into how data are collected, by whom, and how these data are being used. In doing so, they should add to the information base on the feasibility of generating compatible information at the EC level. Information is gathered through a series of key-informant interviews; analysis of available documentation and literature (both peer-review and grey literature); and web-based searches of relevant materials and sources (e.g. government publications or databases).

Each case study section starts off with a general introduction about the drugs situation in the case study country, its policy background and its position in the drugs supply chain. Subsequently, we discuss organisations involved in data collection in the field of drugs policy and provide a generic overview of the data collection and reporting infrastructure. The following sub-sections discuss the most important data collection initiatives in further detail. For each initiative or dataset, we describe: what it is; who collates and owns it;

where the information is drawn from; how it is used; and its limitations and potential areas for improvement drawn from the literature and our key informant interviews. Not surprisingly, the availability of information about these data collection initiatives varies between countries. Consequently, the level of detail for these case studies will differ as well.

6.1   The United Kingdom

The United Kingdom has the highest levels of problem drug use in Europe. Estimates suggest that there are 327,000 problem drug users in the UK, a rate of 0.4 percent of the total population (Reuter and Stevens, 2007). As shown in Table 6.2, 35.5 percent of 16–59 year olds in England and Wales are estimated to have used one or more illicit drugs in their lifetime (*ibid*), and 10.0 percent to have done so in the previous year. Lifetime prevalence is higher, at 36.6 percent, in Scotland (Brown and Bolling, 2007: p11); and lower, at 28 percent, in Northern Ireland (Department of Health, Social Services and Public Safety, 2007) (National Advisory Committee on Drugs, and Drug and Alcohol Information and Research Unit, 2008: p1). Cannabis is the most commonly used drug with a lifetime prevalence of 30.1 percent.

Overall levels of drug use do appear to have been in steady decline since 2003, decreasing from a figure for those reporting having used drugs in the last year (last year prevalence) of 12.3 percent in 2003/4 to 10.0 percent in 2006/7. This may reflect a decline in cannabis use, which has decreased from a last year prevalence of 10.8 percent in 2003/4 to 8.2 percent in 2006/7[63] (Murphy and Roe, 2007: Table 2.1).

Table 6.2: Proportion of 16- to 59-year-olds reporting having used drugs in England and Wales, 2006–2007

Drug	Lifetime prevalence in the UK (%)	Last year prevalence in 2006/7 (%)
All drugs	35.5	10.0
Cannabis	30.1	8.2
Amphetamines	11.9	1.3
Ecstasy	7.3	1.8
Cocaine powder	7.5	2.6
Opiates	0.8	0.2

Source: British Crime Survey 2006/7, Murphy and Roe (2007), table A2.1 and A2.3

6.1.1   Drug policy background

The first National Drugs Strategy was published by the government in 1995 (HM Government, 1995; HM Government, 1995). This has since been revised, updated and reviewed on several occasions (HM Government, 1989; 1998; 2002; 2004). The current strategy, published in 2008, includes an increased emphasis on the effect of drugs on families and children, and encourages the targeting of resources upon those users who are causing the most harm to communities or their families (HM Government, 2008; Home Office, 2008). The key elements of the current strategy are:

- **Prevention**: Prevention in the UK focuses primarily on teenagers and young people through schemes such as 'FRANK' in England and 'Know the Score' in Scotland, which provide information and advice to young people and their families. Drug prevention is also part of the national curriculum. Other measures include safe

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[63] Proportion of 16–59 year olds reporting to having used drugs in the last year, figures for year 2006/7 compared to previous years. Table 2.06, British Crime Survey 2006/7.

clubbing guidelines and selective prevention, focusing on vulnerable young people such as young offenders and young homeless people.

- **Tackling drug-related crime and antisocial behaviour**: The current strategy has a strong emphasis on the link between drug use and crime, and the need to address this through a range of initiatives spanning supply and demand reduction.

- **Treatment and rehabilitation for users**: Substantial investment has been made in the provision of drug treatment services; the UK government spent £604m on treatment programmes in 2008–2009. It is helpful to divide a discussion of treatment services in England and Wales into those provided through community routes, and those provided through the criminal justice system.

- **Reducing drug availability**: The Misuse of Drugs Act 1971, with amendments, is the main law regulating drug use in the UK. It divides controlled substances into three classes: A, B and C; with A being the most dangerous and the category which attracts the most severe penalties for possession, supply and trafficking. It is possession of prohibited drugs, rather than merely their use, which is illegal. The maximum penalties for possession are outlined in Table 6.3, although it should be born in mind that is it also possible to receive a non-custodial penalty or formal warning from the police for some of these offences. Drug-trafficking is also illegal. The Drug Trafficking Act 1994 defines drug-trafficking as any production or supply, transportation, import or export of drugs covered by the Misuse of Drugs Act 1971. The penalties applied depend again on the classification of the drug.

Table 6.3: Penalties for possession by classification in the UK

Class of Drug	Examples	Penalty for a summary conviction made at magistrates court	Penalty on indictment at the crown court
Class A	Heroin, Cocaine, Ecstasy	6 months' imprisonment and/or a fine	7 years' imprisonment and/or an unlimited fine
Class B	Amphetamines, Cannabis	3 months' imprisonment and/or a fine	5 years' imprisonment and/or an unlimited fine
Class C	Barbituates, Ketamine	3 months' imprisonment and/or a fine	2 years' imprisonment and/or an unlimited fine

Source: EMCDDA (2009)

Table 6.4: Penalties for trafficking by classification in the UK

Class of Drug	Examples	Maximum penalty
Class A	Heroin, Cocaine, Ecstasy	Life imprisonment (minimum sentence of 7 years for a third conviction)
Class B	Amphetamines, Cannabis	14 years' imprisonment
Class C	Barbituates, Ketamine	14 years' imprisonment

Source: EMCDDA (2009)

6.1.2 The UK's position in the drug supply chain

The UK is predominantly an end user of drugs, except for cannabis which is also produced in the UK in significant quantities (Serious Organised Crime Agency, 2009). More than half of all cannabis consumed in the UK is grown in the UK, predominantly in factories run by Vietnamese-organised criminal groups (Serious and Organised Crime Agency, 2009b, p. 34). Afghanistan is the original source of around 90 percent of heroin consumed in the UK, with staging posts in Turkey and Pakistan (Serious and Organised Crime Agency, 2009b, p. 26). Columbia continues to be a significant source of cocaine for the

UK, with transport via freighter into Europe, usually through Spain (Serious and Organised Crime Agency, 2009b, p. 29). Significant amounts of cocaine also arrive in the UK through 'drugs mules' on flights from Jamaica. The Netherlands is the main secondary distribution centre for heroin and cocaine, and also produces the vast majority of ecstasy used in the UK. Drugs tend to enter in multi-kilo loads mainly concealed in freight vehicles through the channel ports, though small but significant amounts arrive in passenger vehicles or by air (Serious and Organised Crime Agency, 2009b, p. 7). London, Liverpool and Birmingham are significant centres for drug distribution to the rest of the UK (Serious and Organised Crime Agency, 2009b, p. 8).

6.1.3 Agencies involved in data collection

Much of these data are collected and held by the Home Office Research, Development and Statistics (RDS) Directorate, which collects national data on a range of topics. They are responsible for the British Crime Survey (or BCS, currently carried out by BMRB Limited on behalf of the Home Office) and collect data from police forces in England and Wales and HM Revenue & Customs on the number and quantity of seizures of drugs. They are also responsible for the Arrestee Survey (conducted by NatCen) and the NEW-ADAM Scheme (conducted by researchers at Cambridge University Institute of Criminology) and hold the police-recorded crime statistics. Data gathered are published in the form of statistical bulletins and longer reports which are freely available on their web site. The Home Office RDS used to produce a National Statistics bulletin 'Drug Offenders, England and Wales' but this was withdrawn in 2004 and responsibility for statistics on offending has now been transferred to the Ministry of Justice, who also collect any data from courts and the prison service through the Office of Criminal Justice Reform. The Serious Organised Crime Agency (SOCA) is organising the pilot of the national drugs database with funding from the Home Office, and produces the annual threat assessment as one of its key outputs.

Data are also collected through projects under the remit of the Department of Health, reflecting the split of drugs related issues between enforcement and public health. The National Drug Treatment Monitoring System (NDTMS) is managed by the National Treatment Agency for Substance Misuse (NTA) and operated by nine regional centres.

Data for the EMCDDA on drugs and drug addiction in the UK are collected by the UK Focal Point on Drugs, also based at the Department of Health and the North West Public Health Observatory. The Focal Point collates data and information on drug misuse in the UK and reports them in its annual report.[64] The information is primarily drawn from existing datasets, but is also sourced from interviews with experts. In addition to publishing an annual report, it collates an extensive range of data in the form of standard tables and responses to structured questionnaires, which are submitted regularly to the EMCDDA. It also contributes to other elements of the EMCDDA's work, such as the development of its five key epidemiological indicators, the Exchange on Drug Demand Reduction Action (EDDRA) and the implementation of the Council Decision on New Psychoactive Substances.

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[64] See: http://www.emcdda.europa.eu/publications/country-overviews and http://www.ukfocalpoint.org.uk (as of 24 September 2009).

Other data collection initiatives fall outside the remit of any UK government department. ESPAD is a European project, but in the UK it is run by the Alcohol & Health Research Unit at the University of the West of England. The Independent Drug Monitoring Unit is a company that collects and manages its own data. Some information is made available on the web site, and further statistics are available to purchase.

6.1.4 Overview of drug-related data and analysis infrastructure in the UK

We have categorised the data collected relating to drugs in the UK as follows:

- **Official national datasets**: This includes police-recorded crime statistics, sentencing statistics and arrest statistics, as well as Home Office data on drug seizures produced by the UK Ministry of Justice. These data are regularly published as statistical bulletins, which are publically available.

- **Smaller datasets**: There are several datasets, which are either currently being piloted (in the case of the SOCA drugs database) or are held by single agencies (such as drug treatment services or individual police forces). The data from these are not routinely published in statistical reports or bulletins, nor are they all publically available, and there is not always clarity as to what is included in these datasets.

- **Datasets from surveys**: This includes surveys of arrestees, the general population and sub-sections of the general population. Findings are published in special reports which are publically available.

- **SOCA Annual Threat Assessment**: SOCA makes publically available a version of its annual UK Threat Assessment, which describes and assesses the threats posed to the UK by serious organised criminals. This primarily contains intelligence data drawn from a range of agencies, but also draws some information from smaller datasets and official national datasets.

- **The Home Office Drug Harm Index**: A summary of drug-related harm is gathered and reduced to a quantitative measure which compares the level of harm resulting from drugs use on a year-by-year basis. Much of this is based on the arrestee surveys.

- **UK Focal Point on Drugs**: This organisation is based at the Department of Health and is responsible for collating data and information on drug misuse in the UK to be submitted to the European Monitoring Centre on Drugs and Drug Addiction (EMCDDA). Much of the data in the other categories is summarised and reported in their reports.

6.1.5 Official national datasets

This section provides a schematic representation of each dataset, the type of information collected and the government departments and agencies involved in or responsible for them, followed by more detailed descriptions of each datasets, their uses and their limitations.

Figure 6.1: Map of datasets identified
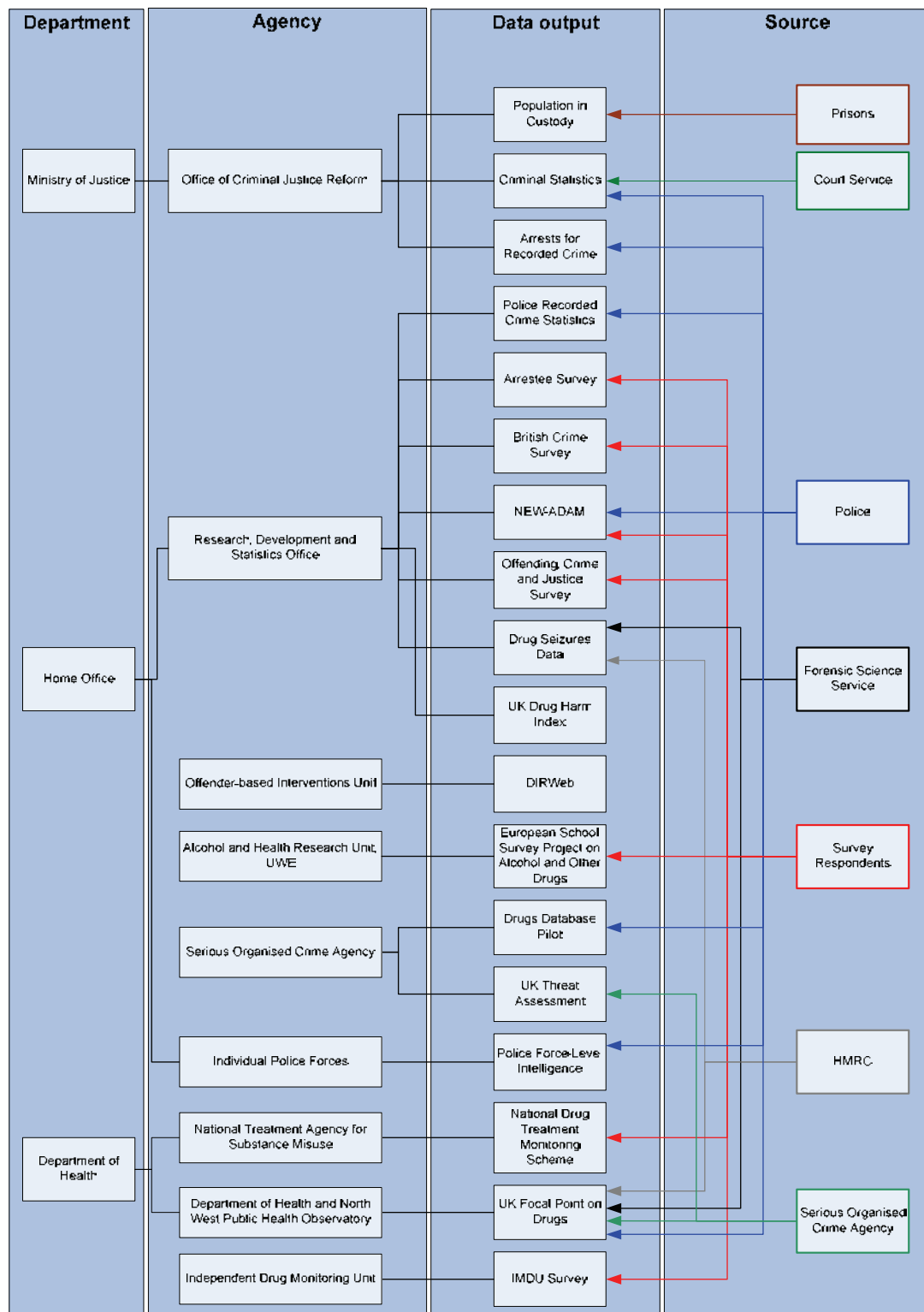
Police-recorded crime statistics

The Home Office publishes data on the number and type of crimes reported to the police in England and Wales, including offences of drug possession and supply (Kershaw *et al.*,

2008). These statistics cover crimes which are reported to and recorded by the police and provide a good measure of trends in well-reported crimes. They are also an important indicator of police workload and provide data for small geographic areas. The information is drawn from police data systems, which is supplied by the police to the Home Office, which in turn uses this information to measure crime rates in England and Wales. It is particularly useful when used in conjunction with data from the British Crime Survey (BCS).

Police recording practice is governed by the Home Office Counting Rules and the National Crime Recording Standard (NCRS).[65] The NCRS was introduced in all police forces in April 2002 to make crime recording more consistent. According to the recording rules, police-recorded crime statistics cover 'notifiable' offences, a category which excludes some minor summary offences (even though the police may record them for their own investigations). The Home Office issues rules to police forces on the counting and classification of crime to avoid double counting where, for example, more than one offence has taken place, maybe on several occasions over a period of time, or there is more than one offender or victim.

Changes to crime recording rules over the last decade have affected the number of offences recorded by the police, and this must be taken into account when interpreting UK police crime data. In interviews, it was suggested that this dataset should not used as a measure of overall levels of crime, since police-recorded crime is shaped by legislation, formal recording rules, police recording behaviour, and the reporting behaviour of the public. Changes in recording rules mean that changes in levels of police-recorded crime have been driven by changes in police behaviour rather than true changes in the level of crime. For some offences, the BCS was thought to give a more accurate picture of the number of crimes. This survey (described below) captures information about a large number of minor personal and household thefts that might not come to the attention of the police. However, the BCS also has omissions: for instance, the BCS does not count crime against companies, offences of fraud, sexual offences and so-called 'victimless' crimes, such as the possession or dealing of drugs. Thus, to get a sense of overall levels of crime both police data and BCS data must be used; each have strengths and weaknesses and neither represents the 'true' level of all crime

Criminal statistics

The annual Criminal Statistics bulletin reports annually about court outcomes. The bulletin contains information on people: who have been given a formal police caution[66] or a Penalty Notice for Disorder (PND);[67] against whom a prosecution has been begun) in

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[65] Details are available at http://www.homeoffice.gov.uk/rds/countrules.html (as of 24 September 2009.

[66] A 'simple caution' is used to deal quickly and simply with those who commit less serious crimes. It aims to divert offenders away from court, and to reduce the likelihood that they will offend again. It is an official warning about the unacceptability of behaviour.

[67] PNDs were introduced by the UK government to provide the police with a quick and effective means of dealing with low-level, nuisance behaviour – often alcohol-related – that typically occurs in city centres at night and weekends. The offender is issued with a fine notice (similar to a parking ticket). The offences for which PNDs can be issued are summary offences where the most likely court outcome would be a fine – so it is possible they could be issued for some low-level drugs offences.

the courts; or who have been found guilty of an offence in the courts. One of the categories of offences in this bulletin refers to 'drug offences', which includes a number of offences of possessing, supplying, importing, exporting and producing illegal drugs. Although these offences are not explicitly distinguished, the bulletin includes information about, for instance: people found guilty of drugs offences, conviction rates for drug offences and the number of cases where a defendant charged with drug offences pleads guilty or not guilty.

The statistical bulletins are published by the UK Ministry of Justice and Office for Criminal Justice Reform (OCJR).[68] The data to produce this bulletin are extracted from the Police National Computer (data about cautions and PNDs), the Magistrates' Court database and the Crown Court Database. Monthly extracts are passed on to OCJR researchers, who undertake an extremely time-consuming process of data cleaning. Due to the time taken for this validation step, data are only published annually, in an aggregated form.

While the bulletin gives a good overview of court outcomes in England and Wales, with regard to drug offences, it is a weakness that there is no further breakdown into specific types of offences. Furthermore, an interviewee from the UK OCJR reported, that errors in the data set may sometimes arise from 'double-keying' by court staff. And finally, another problematic feature of this dataset, highlighted by an observer is that it can be difficult to follow cases as they progress between the magistrates' courts and the crown court – risking double-counting, and making it hard to identify instances where the severity of the offence being prosecuted is reduced during the course of a court case.

Population in custody statistics
The Ministry of Justice publishes, annually and monthly, a statistical bulletin on the number of people serving time in prisons in England and Wales. The reports distinguish between different offences, but include 'drug offences' as one category. This is an important limitation for the purposes of understanding drug-related crime. Data are drawn from the prison administrative IT systems. The data are used to monitor the size and constitution of the prison population by government, researchers, policymakers and others.

Arrest statistics
The Ministry of Justice publishes annual statistics on police arrests, and stop and searches of individuals or vehicles. It includes information on the offence, or suspected offence, to which this relates. It includes information on the number of people who were searched for drugs and arrested for drugs offences, broken down by age, gender and police force area. The Ministry receives aggregated returns from the police that are subsequently approved by the Office for National Statistics. Again, the information in this bulletin merely reports on 'drugs', without further breaking down into possession, supply, etc. The main difficulties in this data collection come from differences in reporting methods and accuracy between different police forces from which data are collected.

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[68] The Office for Criminal Justice Reform (OCJR) is the cross-departmental team that supports all criminal justice agencies in working together to provide an improved service to the public. As a cross-departmental organisation, OCJR reports to Ministers in the Ministry of Justice, the Home Office and the Attorney General's Office.

Home Office statistics on drug seizures

The Home Office annually publishes a statistical bulletin on the Home Office Research Development and Statistics web site on drug seizures in England and Wales (Smith and Dodd, 2009). This reports on:

- the number of seizures by drug type and class (A, B or C)

- warnings about cannabis possession

- the quantity of drugs seized[69]

- purity – but only when requested specifically by the police.

The bulletin includes data on drug seizures made by law enforcement agencies in England and Wales – that is, seizures made by the police, the British Transport Police and the UK Revenue and Customs authority (now the UK Border Authority). Since 2006, the Home Office statistics have not included seizures made by SOCA alone, for fear of double-counting. However, many SOCA seizures are attributed to local police forces (and thus included in Home Office seizure data) when operations have been jointly conducted by SOCA and a local police force. SOCA reports separately on their seizures in their annual report. It is worth noting that the Home Office bulletin states that seizures made by SOCA tend to be much larger than those made by local police forces.

For those seizures reported in the Home Office statistics, the majority of seizures (96 percent by number) are made by the police, but almost half of the total volume is seized by HMRC as their seizures tend to be larger. Forensic science services provide an average for drug purity of all samples tested in a year.

Accounting rules are in place to avoid double-counting and to account for cases where more than one drug type has been seized. The quantities of drugs seized are summarised in terms of kilograms, doses or plants (for cannabis plants only) to aid comparison using conversion factors. Conversion factors are reviewed periodically to reflect trends in average drug preparations on the advice of the Forensic Science Service.

Furthermore, there are indications that there may be selection biases for the decision to send seized drugs to a laboratory for analysis depending on the type of offence and the defendant's plead.[70] If statistics about seizures are taken from these local police crime recording systems, there could be questions about the accuracy of this data. Finally, as data tends to be polarised between very large seizures by the HMRC and large numbers of very small seizures by the police, it is difficult to use the data produced in any meaningful way.

National Drug Treatment Monitoring System

The National Drug Treatment Monitoring System (NDTMS) is involved in the collection, collation and analysis of information about those involved in the drug

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[69] This does not include seizures by SOCA and drugs confiscated frompeople given cautions or entering guilty plea arrangements.

[70] One interviewee from a UK police force indicated that if the defendant pleads not guilty to a *possession* offence, the seized drugs will *sometimes* be sent to the laboratory for analysis. Only if someone is charged with a *supply* offence in relation to the seized drugs is it guaranteed (at least in the police area in which the interviewee worked) that they will be sent to the lab for analysis.

treatment sector. The creation of the NDTMS built upon a development of the Regional Drug Misuse Databases (RDMDs), which had been in place since the late 1980s. It holds information about those involved in drug treatment. NDTMS is the official method of monitoring the extent and nature of structured drug and alcohol treatment in England. Table 6.5 lists the attributes of respondents included in the system.

Table 6.5. Respondents' attributes in NDTMS

Attributes
• Age and gender
• Ethnicity
• Primary and adjunctive drug use
• Injecting behaviour
• Source of referral into treatment episodes
• Modalities/interventions provided
• Waiting times for treatment
• Treatment discharge and successful completion
• Retention in treatment
• Factors associated with retention and successful discharge
• Regional variations and trends

All services that provide structured treatment for drug and/or alcohol users are asked to submit data to NDTMS. This information is analysed by the National Drug Evidence Centre. Data are collected and checked monthly and are reported annually. To maintain client anonymity, data are collected in a pseudo-anonymous form with an individual identified by their 'attributor code' comprised of their initials, date of birth, sex and their Drug (and Alcohol) Action Team (D(A)AT) of residence. NDTMS figures are used to support the government's commitment to the national drug and alcohol strategies. The same figures are also used as part of the Healthcare Commission's 'star-ratings' system for performance managing Primary Care Trusts (PCTs) and mental health trusts. Some NDTMS data are available through their website;[71] other data are available to researchers upon request. The data have been used to inform local commissioning, to monitor Drug Interventions Programmes, for epidemiological studies and for broader research in the field.

SOCA interdiction data

The Serious Organised Crime Agency (SOCA) reports data about the weight of cocaine, heroin, opium and cannabis interdicted in the UK and overseas. These data are used by SOCA to report on its performance and published in the Agency's annual report to Parliament (Serious and Organised Crime Agency, 2009a).

There is some lack of clarity about the relationship between SOCA interdiction data and the Home Office data on drug seizures. Particularly, it is not clear whether seizures which are carried out by SOCA in conjunction with local police forces are only counted by police forces and reported by the Home Office, or whether they might also be counted by SOCA. A footnote in the SOCA annual report states that data about cannabis seizures for 2006/07 'represent seizures as a result of UK-based operations in 2006/07'. SOCA data also include interdictions made overseas, and do not appear to separate out where seizures were made.

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[71] http://www.ndtms.net/default.aspx (as of 24 September 2009).

SOCA is also responsible for the creation of Project Endorse, a national forensic drug initiative intended to support UK law enforcement agencies and their strategic partners. SOCA notes that a key element of project endorse is "a national forensics drugs collection plan based on the acquisition of physical and chemical information from UK drugs seizures to national laboratory standards."[72] Currently, the programme focuses on collecting detailed information on all illicit Class A drug and amphetamine seizures over 25 grams throughout the UK. After a seizure, the sample is sent to a lab for testing and the resulting information is entered into a computer database. In addition to collecting information about purity and cutting agents, the database includes other information including pictures of the seized substances—which makes it easier to help link samples from different seizures together. As part of SOCA's Project Eager, the purity information from Project Endorse is merged with price information at the wholesale and retail for heroin, cocaine, and amphetamine.

6.1.6 Datasets from surveys

Independent Drug Monitoring Unit Survey

The Independent Drug Monitoring Unit is a drug prices research company, conducting large-scale drug user surveys throughout the UK and on the internet (Independent Drug Monitoring Unit, 2009).[73] These surveys of drug users in the UK have been conducted since 1982, and since 1994 they have been gathered in a database of over 22,000 regular drug users. The survey is conducted annually and a number of common questions are included in all surveys, allowing year-on-year comparisons to be drawn. Data are collected at festivals and other major events. The survey is also available online and takes from 5–20 minutes to complete. Questions involve drug prices, and other drugs information such as consumption patterns of drugs and medicinal use of drugs. The Independent Drug Monitoring Unit annually publishes a summary of these statistics on topics such as attitudes to drugs, drug experiences, drugs and driving, arrest and crime statistics, demographics (age, sex, occupation, etc), and many other questions revolving around use of cannabis and other drugs.

Arrestee Survey

The Home Office Research, Development and Statistics Directorate commissioned an arrestee survey from the National Centre for Social Research (NatCen). Three sweeps of the data were collected in 2003–04, 2004–05 and 2005–06 (Boreham *et al.*, 2007) and data from the final sweep and any significant changes between sweeps were mentioned in the final report. It was the first nationally-representative survey of self-reported drug abuse among individuals arrested in England and Wales.

Interviews were conducted in police custody suites, which were selected from a list of those available on the basis of the flow of the arrestees and whether they were open 24 hours a day. A total of 60 were selected, where interviews were conducted by staff, many of whom were ex-police officers, in 6-hour shifts. These initially covered the full 24 hours, but the 12am–6am shift was abandoned later, as arrestees are required to get five hours of

[72] Some of the information about Project Endorse was obtained from a presentation made by SOCA's Michael Stevens at our Policy Expert meeting in July 2009.

[73] See: http://www.idmu.co.uk/ (as of 24 September 2009).

uninterrupted rest during this period making interviews impractical. Interviews consisted of computer-aided questioning, covering the topics outlined in Table 6.6, and a saliva test.

Table 6.6. A sample of questions included in the 2003–2006 arrestee surveys

Example questions
• All respondents were asked about their use of ten different individual drugs over a range of time periods, including in the last week, last month or last year.
• Respondents were also asked when they last used each drug (if they had ever used it). The drugs included in the questionnaire were: cannabis, heroin, crack cocaine, powder cocaine, tranquillisers, ecstasy, amphetamines, unprescribed methadone, magic mushrooms and LSD.
• Respondents who had ever used any of the ten individual drugs surveyed were asked how often they usually took each drug.
• Respondents who had ever used amphetamines, heroin, crack or powder cocaine (or drugs other than the specific ten listed drugs) were asked whether they had ever injected drugs.
• Dependence on individual drugs was measured using the Severity of Dependence Scale (SDS), which uses five questions to measure dependence. Dependence was only measured for heroin, crack and powder cocaine.
• Respondents were asked whether they had ever committed crime while under the influence of drugs, whether they had ever committed crime in order to acquire drugs, and whether they would have committed crime if they had not been drug users.
• Other factors such as age, sex, previous contact with criminal justice system, etc were also recorded.

The content of the questionnaire was based on themes designated by the Home Office according to their policy needs, but specific questions were developed by NatCen. This primarily covered drugs taken and crimes committed, but included other related questions. Topics added at a later date included questions about gangs and increased details on ecstasy use to match the higher levels of data collection for the most damaging drugs: heroin, crack and cocaine.

The survey was not continued after 2006 following a review by the Home Office. This was partly due to some of the practical issues outlined below. Although several studies have been published using the arrestee survey data (e.g. Pudney *et al.*, 2006, who used the dataset to help estimate the size of the UK illicit drug market), the Home Office concluded that the data were not being used sufficiently to justify the cost of conducting the survey. Vast amounts of data were collected, which could only be summarised in the annual reports produced. Further secondary analysis has taken place within the Home Office on the basis of this data, and these reports are available through the Home Office RDS. The collected data are also available through the UK data archive.

A range of limitations with this survey were identified through interviews with people involved in developing and conducting the survey. The survey was designed to avoid methodological issues such as selection bias. However, this was undermined by a low response rate resulting from various practical issues surrounding the interview process. Availability of offices in which to conduct interviews was an issue, as well as availability of police officers to escort arrestees from cells to these offices to conduct interviews and to monitor the safety of interviewers. Many subjects could not be interviewed as they were violent, drunk or would have otherwise endangered the interviewers. Furthermore, time was limited. The PACE Act 1984 states that arrestees must be processed by police as quickly as possible. This means time slots for the half-hour survey could be difficult to coordinate in many cases. In some periods, the number of arrestees processed was too great for the interviewer(s) present to be able to see each one. Arrestees also need to be interviewed within a limited period following arrest to enable drugs testing, which provided a further time constraint. The combination of these factors resulted in a response

rate of around 20–25 percent. These problems resulted in a selection bias for arrestees willing to cooperate.

There were further complications when comparing data year on year, as police enforcement practices were not consistent. Particular areas of criminal activity may be target areas for a particular year, and this would alter the population of people arrested. There was also a bias in response, with young people much more likely to respond to questions. This also varied by crime committed. There were attempts to account for this in the non-response weighting, but as respondents only accounted for a low proportion of the total population, this was difficult to achieve with any precision.

Interviews for this case study revealed that these methodological concerns were a significant reason why funding of this dataset had not been renewed, citing participation biases and questions surrounding representativeness of data due to the limited number of locations used. They also questioned how well the findings could be extrapolated from the arrestee population to the offending population as a whole.

NEW-ADAM

The NEW-ADAM programme was an arrestee survey that collected data from interview and urine samples of arrestees in police custody suites. The programme was launched in July 1999 and ran for three years, ending in March 2002. The survey was sponsored by the Home Office and carried out by researchers at the University of Cambridge. The programme was funded to run for three years in the first instance. It was designed to be a rolling programme of research across 16 locations, surveyed every two years in groups of eight.

Table 6.7. Topics covered in the NEW-ADAM programme

NEW-ADAM topics
• Urinalysis findings on drug uses: prevalence of positive tests for various kinds of drugs.
• Self-reported drug use: arrestees' admitted drug use over various periods of time, including in the last 12 months, the last month and in the last three days for 19 different drug types.
• Expenditure on drugs: amount spent on drugs over the last seven days and over the last year.
• Illegal income: the amount of admitted illegal income generated over the last 12 months.
• Self-reported crime: self-reported offending among arrestees in relation to ten common income-generating crimes.
• Drugs and crime: arrestees' views on the connection between their own drug use and crime.
• Drug dependence: the prevalence of dependence on different types of drugs.
• Injecting behaviour: prevalence of injection drugs.
• Treatment: previous experience of treatment services and their current treatment needs.
• Drug markets: the way in which users of heroin and crack/cocaine purchase their drugs and the ease with which they are able to obtain drugs.
• Weapons and guns: the use of weapons and guns in crime and arrestees' reasons for possessing or having access to a gun.

However, funding was not available beyond three years and the programme ended in March 2002, although arguments have been made for its continuation (e.g. Bennett and Holloway, 2007). Data were collected through urine samples and structured interviews which were conducted in police custody suites. A sample of arrestees was surveyed using methods similar to the US Arrestee Drug Abuse Monitoring (ADAM) programme. The interview consisted of a core questionnaire, very similar to that used in the ADAM survey in the US, and two versions of a follow-up questionnaire, which asked additional questions relating to drug use, lifestyle, gun ownership and drug markets. All interviewees completed the core questionnaire, while half the interviewees were randomly allocated to one of the two versions of the follow-up questionnaire.

Interviews were conducted in a sample of 16 custody suites over a 30-day period, with an interviewer present on site 24 hours a day over the 30-day period. Practical problems, such as subjects not being in a fit condition to conduct an interview and an inability to process all arrestees in busy periods, were similar to those experienced in the later Arrestee Survey (see above). Around 57 percent of arrested subjects were found to be eligible for interview. Ineligibility could result from being unfit for interview (intoxicated or unwell); unable to comprehend and consent to the interview; being a potential danger to the interviewer; and being unavailable within an appropriate time frame following arrest for drug testing. Of those eligible, 62 percent were approached for interview. This was largely due to time restrictions as described in the discussion of the Arrestee Survey. Of those approached, 85 percent were interviewed, with 92 percent of those giving urine samples. Again, young males were found to be more likely to respond to questioning than other groups.

The NEW-ADAM results have been used in various studies, including:

- to understand the prevalence of drug use and accuracy of self-report information for arrestees in the UK (Taylor and Bennett, 1999)

- as a critically important way to estimate the size of the drugs market in the UK (Pudney *et al.*, 2006)

- to understand the relationships between drug use and crime (Bennett and Holloway, 2009).

Offending, Crime and Justice Survey
The Offending, Crime and Justice Survey (OCJS) is a nationally conducted, longitudinal, self-report survey asking young people (aged 10–25) in England and Wales about their attitudes towards and experiences of offending. The survey was conducted annually between 2003 and 2006 by the British Market Research Bureau on behalf of the Home Office. It involved some questions pertaining to drug use, for example, types of drugs used and frequency of use. Respondents were also asked about the relationship between drugs and crime, such as whether offences were conducted under the influence of drugs or in order to obtain drugs. The central focus, however, was on offending rather than drug use. Victimisation data were also collected and it is noted that the statistics collected here did differ from figures found in the British Crime Survey (BCS).

Surveys were conducted in the home, with parental consent where necessary. In the first sweep, around 12,000 people aged 10–65 were surveyed. In subsequent sweeps, only those aged 10–25 were surveyed, and the group consisted of a mix of previously interviewed people and new respondents. The total sample size in these subsequent sweeps was around 5,000. Longitudinal data were collected in order to map the pathways into and out of criminal behaviour. The interview lasted around an hour and was computer-assisted, with the most sensitive modules using Audio-CASI, in which the respondent listens to questions on headphones and enters their own answers into a laptop, unaided by the interviewer.

The survey was discontinued in 2006 due to a lack of funding, but there was interest in continuing the survey if more money became available. The data are stored in the database

at Essex University and has been used in a series of reports after analysis by the Home Office (e.g. Roe and Ashe, 2008; Home Office, 2006).[74]

European Schools Project on Alcohol and other Drugs survey and other school-age drug-use surveys

Surveys of school-age drug use are conducted annually in England (since 1998) and similar data are gathered, if less frequently, in the other regions. The European Schools Project on Alcohol and other Drugs (ESPAD) survey provides data for students aged 15–16 every four years, and the latest figures available in the UK relate to 2003. The main goal of ESPAD is to study drug use in Europe among adolescents by collecting comparable data on the use of alcohol, tobacco and other drugs among students. This will allow mapping of long-term trends and difference between European countries, which will enable risk factors, consequences and context surrounding adolescent drug use to be investigated (Hibell and Andersson, 2006).

ESPAD gathers data from students who turn 16 years old during the calendar year of data collection, excluding those unable to contribute easily such as those with severe mental or physical handicaps. A representative set is desirable, consisting of not less than 2,400 participants, to allow breakdown by sex and another variable. The questionnaire contains core questions covering background variables; alcohol, tobacco and drug-related questions; and some questions for methodological purposes. There are also optional modules on 'Integration', 'Mainstream', 'Psycho-social measures', 'Cannabis' and 'Deviance'. Data are collected in March or April. Surveys are carried out in class, and survey leaders (which may be teachers or research assistants) receive written instructions describing how to perform the survey and how to fill out the standardised classroom report. The questionnaires are answered anonymously and sealed in individual envelopes by the students (Hibell *et al.*, 2009).

British Crime Survey (BCS)

The British Crime Survey (BCS), conducted continuously since 2002, is the primary source of information regarding levels of drug use in England and Wales (e.g. Murphy and Roe, 2007). Data on levels of crime are also collected. The BCS surveys a representative sample of the UK population through face-to-face interviews on an annual basis, conducting around 50,000 interviews. Similar surveys are conducted in Scotland and Northern Ireland. In Northern Ireland, an additional Drug Prevalence Survey has been conducted (for the first time in 2002–2003, and again in 2006–2007) following EMCDDA methods.

The BCS measures levels of crime that may not have been either reported to the police or recorded by them. It thus provides an important additional source, supplementing police-recorded crime statistics, which necessarily cannot include information on these unreported crimes. In 2007–2008 for example, twice as many crimes were recorded in the BCS than in police-recorded crime statistics. The BCS also helps identify those most at risk of different types of crime by providing demographic details alongside the crime data. This information is used in designing and informing crime prevention programmes. It is

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[74] Other publications from the OCJS are available at:
http://www.homeoffice.gov.uk/rds/offending_survey.html (as of 24 September 2009).

also used to assess people's attitudes to crime and towards the criminal justice system. The data are available in the UK data archive for general use, and are used across a range of government departments.

The BCS does not collect much information on drugs, focusing on prevalence data largely because of the limited space for questions on this topic in such a wide-ranging survey. Furthermore, the BCS only covers England and Wales. However, similar data are collected in Scotland and Northern Ireland. It is interesting to note that when the Scottish survey was changed from a paper survey to an online survey in 2006, bringing it in line with the England and Wales survey, a significant increase in reported drug use was seen. The reason for this is not completely clear. It may be that the electronic format gave an increased sense of anonymity and data security. However, it is also possible that the form in which the questions were asked gave an increased accuracy in reporting. In contrast to the print survey, the online survey introduced each drug separately, leading to further detailed questions for any drugs that had been used. The same effect had been seen when the BCS changed format from paper to an electronic survey.

6.1.7 Threat Assessment

Published annually, the UK Threat Assessment details the key threats to the UK identified by SOCA, including those related to drugs trafficking price of drugs; quantities of drugs entering the UK; drug-trafficking routes (internationally); drug distribution in the UK; and the main drug-traffickers and suppliers. While produced by SOCA, the UK Threat Assessment is a collaborative effort based on information and intelligence drawn from a wide range of sources, both in the UK and abroad. Two versions of the Threat Assessment are published: a restricted version, which is only available to those with appropriate security clearance; and a shorter, unrestricted version which is made available to the general public (SOCA, 2009b).

6.1.8 UK drug harm index

The UK drug harm index compiles a summary of drug-related harm and reduces it to a composite measure comparing the level of harm resulting from drugs use on a year-by-year basis (MacDonald *et al.*, 2005). The criteria included in this index, selected largely on their measurability, are summarised in Table 6.8.

Information for this index is primarily collected from sources discussed previously, such as the British Crime Survey or police-recorded crime statistics. No primary data collection is involved. Available data are accumulated and each harm criterion is weighted according to its 'social cost' to give an overall harm measurement for the year. For example, a number of indicators focus on drug-related acquisitive crime, using data from arrestee surveys.[75] Many harms associated with drug use, such as unemployment and homelessness, are not included due to the difficulties in attribution and measurement of the proportion of incidents resulting from drug use. The social cost of a particular drug-related incident or harm is

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[75] For example, an arrest for one of the crimes listed in the table committed by an arrestee reported to use either heroin, cocaine or crack within the previous 30 days (for NEW-ADAM) or four weeks (for the Arrestee Survey) is considered to be for a drug-related acquisitive crime. The fraction of drug-related acquisitive crime is then calculated as the number of these cases divided by the number of arrests on suspicion of an acquisitive crime within the same period. The proportions established from the arrestee surveys are then scaled up the overall statistics for those types of crimes using data from other sources such as the BCS or crime statistics.

assumed to be fairly consistent, so figures change from year to year largely based on the volume of each harm.

Table 6.8. Criteria currently included in the UK drug harm index

Harm category	Criterion
Health impacts	• New HIV cases due to intravenous drug use (IDU), including those infected through heterosexual sex with someone who contracted the disease through IDU (Communicable Disease Surveillance Centre (CDSC)). • New Hepatitis B cases due to intravenous drug use (CDSC). • New Hepatitis C cases due to intravenous drug use (CDSC). • Drug-related deaths (Office for National Statistics). • Drug-related mental health and behavioural problems (Hospital Episode Statistics). • Drug overdoses (Hospital Episode Statistics). • Drug-related neonatal problems (Hospital Episode Statistics).
Community harms	• Community perceptions of drug use/dealing [e.g. local availability] as a problem (British Crime Survey). • Drug dealing offences (Recorded Crime Statistics).
Domestic drug-related crime: All British Crime Survey, calibrated with NEW-ADAM/Arrestee Survey	• Burglary • Theft of vehicle • Theft from vehicle • Bike theft • Other theft • Robbery
Commercial drug-related crime. Calibrated with NEW-ADAM/Arrestee Survey and Crime Statistics	• Shoplifting (Crime & Justice Survey & Arrestee Survey) • Burglary (Commercial Victimisation Survey) • Theft of vehicle (Commercial Victimisation Survey) • Theft from vehicle (Commercial Victimisation Survey)

A number of limitations of the UK drug harm index and its methodology have been identified. The first and foremost limitation relates to the attribution problem: it is impossible to consider the counterfactual and to assess the extent to which these measured harms would have existed in the absence of drugs.

Second, there are no time-series data on the proportion of crimes that are drug-related. Data are only available for the years when NEW-ADAM or the Arrestee survey was conducted. For other years, the proportion is estimated using the average from these two surveys along with longitudinal data from the Offender's Index, which allows mapping of offenders who have been convicted of both drugs crime and acquisitive crime. Furthermore, the approach does not require the subject to be under the influence of drugs when committing the crime, nor does it probe whether crime was a motivator for this crime or account for the counterfactual. Whether drugs have been the determining factor for committing the crime is therefore uncertain.

Third, data sources, comparable to the BCS, to help in estimating the number of commercial crimes are not available. The index assumes a constant reporting/recording rate within each crime category. Consequently, the estimated volume of crimes with a commercial victim is proportional to recorded crime within that category. Similarly, estimates of most unit costs are available only for a single benchmark year. The index therefore assumes that unit costs are proportional to an appropriate price index.

6.1.9 Smaller datasets

Observers indicated that SOCA is currently piloting a national drugs database. This system would compile information on the chemical make-up, purity and wrapping of drugs seized

throughout the UK by all enforcement agencies, allowing SOCA to track the distribution of drugs through the UK and trace them back to their original source. If continued, it will form the most comprehensive database of drug seizure information compiled in the UK. The pilot project has been set up with £400,000 funding from the Home Office to test the practical value and the strategic and tactical benefits of the database, and SOCA is inviting law enforcement partners to feed back their views. A decision on whether to extend the arrangements beyond the pilot phase will be taken once all the evidence from the pilot has been assessed.[76]

In addition to this pilot system, there are a number of other small datasets, including local police-force intelligence databases and the Drug Intervention Management Information System.

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[76] Information available through the SOCA website http://www.soca.gov.uk (as of 24 September 2009).

6.2   Czech Republic

In the Czech Republic, approximately 20 percent of the adult population (aged 18–64) have used an illicit drug at least once (Ústav zdravotnických informací a statistiky, 2006). Lifetime prevalence is significantly higher among young people, at 35 percent of pupils in the last grades of basic schools and 45 percent of first-year secondary school students (Csémy *et al.,* 2006).

The most frequently used substances included cannabis (21 percent), ecstasy (7 percent), and magic mushrooms and other natural hallucinogens (3.5 percent) (Ústav zdravotnických informací a statistiky, 2006). Among 15–16 year olds, trends are similar, with lifetime prevalence highest for cannabis (11 percent), and lower for ecstasy (8 percent) and amphetamines (4 percent) (Csémy *et al.,* 2006). The Czech Republic has a history of epidemic methamphetamine (both recreational and problem) use that dates back to 1970 (Zábranský, 2007). Pervitin, a methamphetamine, remains the most widespread 'problem drug' by far in the Czech Republic.

Inhalants are also popular among young people, with 9 percent of 15 year olds having used them at least once according to a 2006 study (Csémy, 2007). Cocaine use has been nearly non-existent in the Czech Republic. Zábranský (2007) suggests that the good market position of pervitin in all social segments leaving little space for another stimulant drug could be an explanation for the low prevalence of cocaine.

Figure 6.2. Lifetime prevalence of experience with the use of selected substances, 2007 ESPAD Survey
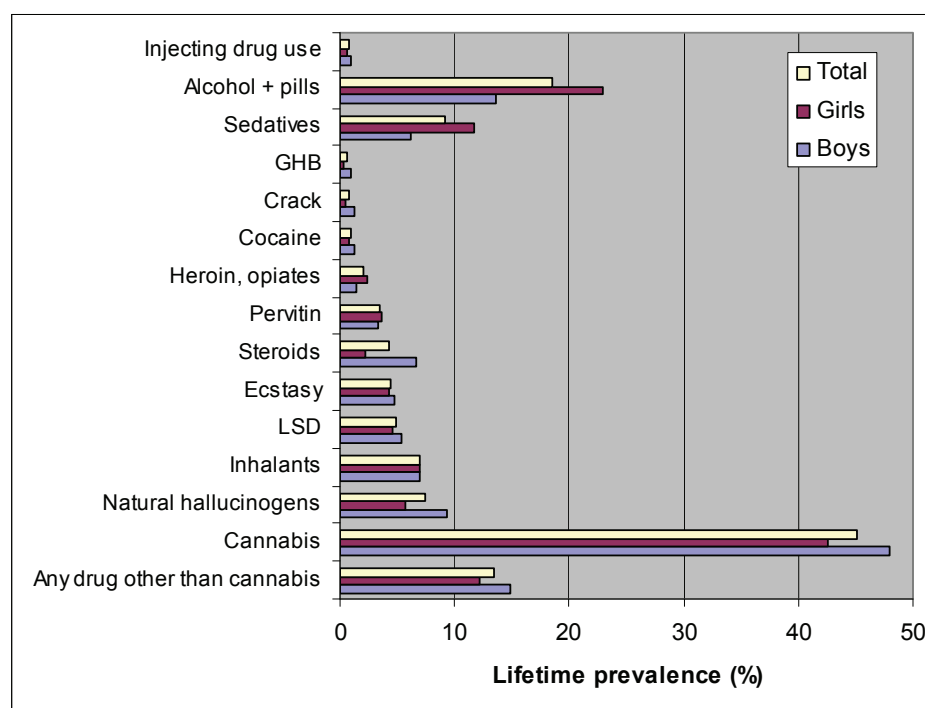
Source: Csémy *et al.* (2008)

6.2.1 **Drug policy background**

Drug legislation

Drugs offences are covered under the Criminal Code and the Act on Misdemeanours. Under this legislation, the possession of greater than small quantities of drugs can result in sentences of up to two years of imprisonment (or 5 years in the case of aggravating circumstances in the offence). Possession of small quantities without the intent to supply attracts smaller penalties, generally administrative sanctions such as a fine or warning. Trafficking results in more severe sentencing of up to 10–15 years of imprisonment, depending on aggravating circumstances. Alternatives to imprisonment are often used in the case of addicts, such as suspended sentences, community service and probation with treatment.

In 2007, the bill for a new Penal Code, which included major changes such as a differentiation of sanctions for possession of different drugs, was approved by the Czech government. In particular, the possession or growth for personal use of cannabis would attract less severe penalties, along with other plants containing psychoactive substances, such as mushrooms. The Penal Code is still being considered by the Chamber of Deputies of the Czech Parliament.

Tackling methamphetamine production in Czech Republic

There is a high prevalence of methamphetamine, referred to as pervitin, use in the Czech Republic. Pervitin can be produced from precursors found in legally available drugs. Certain over-the-counter medicines for (self-)treatment of common colds contain Pseudoephedrine, which has been the main precursor used to manufacture pervitin in recent years. This makes it difficult to control the supply of the drug precursors.

Recent discussions of an inter-ministerial working group have attempted to tackle this issue and this discussion led to the introduction of new legislation, effective from January 2009, which restricts and monitors the sale of a category of medicinal products which contain pseudoephedrine. The restrictions include:

1. a ban on mail order supply

2. a maximum limit on the dose available, which is 1800mg of pseudoephedrine per patient per month (which means in practice a maximum of 60 tablets containing 30 mg pseudoephedrine)

3. registration of the release of such medicines by the pharmacist to the 'central repository of electronic prescriptions', which consists of identification data on the patient, the product including the charge, and the quantity of packages released.

However, this new legislative situation does not prevent pseudoephedrine from entering the illicit drugs supply chain; it can be imported from other countries such as Germany, Slovakia and Poland. In these countries these medicines are freely available and in many cases have a higher pseudoephedrine component than those available in the Czech Republic. In an interview with staff from the National Monitoring Centre, the respondent described how colleagues from the Customs Administration have been monitoring the seizures of the medicine precursors at customs, and have been catching people in cars with significant quantities of the relevant medicines. An interviewee mentioned that these issues are under discussion between the National Monitoring Centre and prosecutors. However,

it is difficult to prohibit import of these licit drugs; there is a risk of criminalisation of law-abiding citizens. Furthermore, an observer suggests that there is a powerful drugs lobby preventing these ideas gaining popularity within government.

A further complication of law enforcement is that the Czech Republic is part of the Schengen zone of open border, and, according to one observer, stringent border control is therefore rare. Also, pervitin production is very decentralised and labs are small, making them hard to track down and making large seizures uncommon. The latest statistics show that in 2008, 15 litres of pseudoephedrine solution were seized by law enforcement officials (Mravčík *et al.*, 2008). However, this is unlikely to be a reliable estimate of the amount of pervitin production.

National drugs strategy[77]

The Czech Republic established a national drug strategy for the period 2005–2009, with an action plan for the first two years which was reviewed and modified in 2007 for the period 2007–2009. The strategy focuses on illegal drugs but also addresses alcohol and prescription drugs, and has two main goals:

1. to combat organised crime associated with the unauthorised handling of drugs and to enforce the observance of laws in connection with the distribution of licit drugs

2. to reduce the use of all types of drugs and potential risks and damage that may affect individuals and society as a consequence of drug use.

This is approached through four main strands: 1) prevention, 2) treatment and re-socialisation, 3) risk reduction, and 4) supply reduction. The new 2007–2009 action plan covers seven policy fields: primary prevention; treatment and aftercare; harm reduction; drug-supply reduction and law enforcement; information/research/evaluation; coordination and funding; and international collaboration.

An observer claims that over the past two decades, the Czech Republic has developed a focus on evidence-based drugs policy. This tradition is also reflected in the Czech Republic's systematic approach to drug policy evaluation. This will be repeated on a periodic basis (two years) in order to assess the impacts of the new legislation.

6.2.2   The Czech Republic's position in the drug supply chain

Cannabis and methamphetamines are the most widely available drugs in the Czech Republic (Mravčík *et al.*, 2008). Traditionally, both of these drugs also accounted for the highest numbers of seizures. Domestic production of marijuana with a higher THC content has been on the rise. It is grown in artificial conditions and, with increasing frequency, on a large scale. The volume of the marijuana seized increased slightly, and there was a significant increase in the number of cannabis plants seized; both the number and volume of hashish seizures have declined in the last four years (*ibid*).

Heroin primarily reaches the Czech Republic (and much of the European market) through the Balkan route from Afghanistan (*ibid*). Methamphetamine (known locally as pervitin) is produced in the Czech Republic in clandestine laboratories, and there has been an increase in its export to neighbouring countries such as Germany and Austria (*ibid*). Few other

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[77] Based on NMCDDA's 2007 REITOX report (Mravčík *et al.,* 2008).

drugs are produced in the country; most of the ecstasy tablets on the Czech market come from the Netherlands, Belgium and Poland. Cannabis is the most frequently seized drug, representing 51 percent of all drug seizures in 2006 (*ibid*).

Methamphetamines are particularly available under the trade name pervitin. Over the last few years, there has been a slight increase in both the volume and purity of the pervitin seized. Pervitin is produced in the Czech Republic exclusively, and is partly exported abroad, mainly to Germany.

The availability of heroin, which reaches the Czech Republic mainly from Afghanistan via the so-called Balkan route, has not changed; the volume of the heroin seized showed a slight decrease (*ibid*). First and foremost, ecstasy is commonly available in recreational nightlife settings; the number of seizures of this drug, although widespread, remains relatively low. Nevertheless, the quantity of ecstasy tablets seized in 2007 was the largest in the last three years. According to the available information, the prices of most drugs remain stable.

The availability and purity of cocaine has been increasing, particularly in recreational nightlife settings; its price has dropped slightly. In 2007, the Czech Republic experienced its highest ever volume of cocaine seizures (*ibid*). Even when significant amounts of cocaine were regularly seized by Czech customs in the early 1990s, virtually all the cocaine was designated for transit to Scandinavian and West European countries (Zábranský, 2007).

6.2.3   Agencies involved in data collection

The Council of the Government for Drug Policy Coordination is the main coordinating and initiating body on drug-related issues. The Secretariat of the Council organises the distribution of subsidies to service providers (mainly NGOs) in the sphere of treatment of drug addiction and reintegration. Furthermore, the Secretariat is also responsible for accreditation, monitoring, evaluation and coordination of delivery of drug treatment, medical and inpatient facilities at the regional/local levels. The Council informs the government and the public about the drug situation by presenting the Annual Report on the State of the Drugs Problem in the Czech Republic. The Council includes all ministries involved in the delivery of the national drug policy and three representatives of civil society respective regions (Czech Medical Association – Association for Addictive Diseases, Association of NGOs dealing with drug prevention and treatment, and Association of the Regions). The Secretariat is part of the Office of the Government of the Czech Republic and also includes the Czech National Monitoring Centre for Drugs and Drug Addiction (NMCDDA, Czech national focal point), set up in 2000. The monitoring centre is responsible for collection, analysis and distribution of drug-related data and coordinates and methodologically manages other state and independent institutions which contribute to the collection of data on the monitored indicators. The current system of reporting key indicators, as set up in collaboration with EMCDDA, is thought to work relatively smoothly. An interviewee commented that the first few years were marked by a few inevitable initial mistakes, but these have now been resolved.

The national monitoring centre organises the activities of several working groups established by the Council. The Advisory Committee for Data Collection is one such working body. The main task of the committee is to evaluate the plan of activities of the

National Monitoring Centre and 'supervise' the preparation of the Annual Report (Mravčík *et al.*, 2008).

Data on seizures, price, purity and drug-related crime are gathered by the police national drug headquarters. They draw this information from the regional police forces, the customs agency and forensic labs, both locally and at the national forensic science institute. This information is then passed on to the NMCDDA.

The probation and mediation service and the prisons service also report information on drug use and drug-related services to the NMCDDA, as well as information about prosecuted and sentenced offenders. The statistics from the public prosecutors' offices and the courts are gathered by the Ministry of Justice and are also passed to the NMCDDA. A crucial aspect of the Czech system of collaborative data collection is the 'Task force of the national focal point for data collection in the supply reduction field'. Stakeholders from different perspectives have been involved in this Task force, including: representatives of the High Attorney's Office, the Probation Office, and Court representatives. Finally, the Criminal Statistics Record System (ESSK) also records information on drug-related offences.

The Public Opinion Poll Centre at the Institute of Sociology of the Academy of Science of the Czech Republic gathers data on public opinion towards drugs and drug use, although not on any regular basis (CVVM 2009). The Institute of Health Information and Statistics of the Czech Republic gathers other survey data on health and lifestyle choices, including those related to drug use (IHIS CR 2009). A number of surveys are also conducted by other organisations such as the European School Survey Project on Alcohol and Other Drugs (ESPAD), Eurostat and the Centre for Evaluation, Prevention and Research of Substance Abuse (CEPROS).

6.2.4   Overview of drug-related data and analysis of infrastructure in the Czech Republic

The majority of data related to drugs is collected by the Czech National Monitoring Centre for Drugs and Drug Addiction (NMCDDA). NMCDDA was established in 2002 within the structure of the Office of the Government of the Czech Republic – Secretariat of the Council of the Government for Drug Policy Coordination. As the Czech National Focal Point for Drugs and Drug Addiction, it is partner of the REITOX network for drugs monitoring – coordinated by the European Monitoring Centre for Drugs and Drug Addiction in Lisbon.

The main publication of this data is the annual (REITOX) report in which all data on drug use and drug-related crime are summarised and analysed (Mravčík *et al.*, 2008). The report is made publicly available. The monitoring centre produces few other publications. However, more detailed information is available for their close collaborators, academic researchers (e.g. Centre of Addictology) and for the members of working groups. Working groups are groups of researchers (generally from the National Monitoring Centre) who look in more detail at specific issues related to drugs. For example, the early warning group focuses on new drugs and new data, and the working group on law enforcement data looks at data relating to arrests, etc. There are a number of such working groups. On the basis of the data collected, the National Monitoring Centre also makes recommendations on data collection policy and also on wider Czech drug policy.

Although the Centre is aware of broader European policy through conferences and through the EMCDDA in particular, and the majority of their data collection is aligned with EMCDDA standards, it can sometimes be difficult for them to make the changes necessary to align some data collection efforts with European standards. One interviewee attributed this to overarching issues of inflexibility among the national organisations that they rely upon for data provision. According to this observer, making changes to the data collection system is slow due to bureaucracy and often meets with opposition, as illustrated by recent plans to improve the data on drug use in prisons as outlined below.

The recent Czech Presidency of the European Union targeted improving indicators to measure the effectiveness of drug supply-reduction strategies as one of its key priorities. As part of this strategy, the presidency suggested a new indicator to improve the evidence-based measurement of drugs supply-reduction strategies, namely the:

• amount of drugs that were handed over as evidenced by the police to the public prosecutor ('proven drugs')

• amount of property sealed/frozen in the same stage of the criminal proceedings.

An additional proposal involved not just measuring the total amount of seizures, but breaking them down into ranges of different sizes. Measuring these indicators should better reflect priorities and crime targeted. It was argued by one of the interviewees that the increased attention to supply-reduction indicators is a sign of the Czech Republic's frontrunner role in thinking about supply-reduction indicators.

In the following sections we discuss the most relevant data collection initiatives in the Czech Republic.

6.2.5 Datasets from surveys

There are a number of surveys conducted in the Czech Republic which gather data related to drugs. The majority of these survey drug-use among the whole or subsections of the population, but some cover other issues such as price and attitudes towards drugs. These surveys comprise the:

• General Population Survey

• European Schools Project on Alcohol and other Drugs (ESPAD) survey and other school-age drug use surveys

• Local School Surveys

• European Core Health Interview Survey

• Attitudes Towards Drugs survey

• Dance and Drugs Survey.

6.2.6 Problem drug use

Problem drug use has been estimated in the Czech Republic since 1999, using a combination of capture-recapture, nomination, and multiplicator methods (Mravčík and Zábranský, 2002). In addition, a questionnaire survey among general practitioners was used to estimate opiate problem users in 2003, 2005 and 2007.

6.2.7   Drug-related crime and justice data

There is a wide range of drug-related criminal and legal data collected. These include criminal statistics but also data on price and purity collected from seizures and also other data collected by the legal system.

Criminal Statistics

Statistics on drug-related offences in the Czech Republic are developed through a number of initiatives. These include:

- the Criminal Statistics Record System (ESSK)

- the statistics of the dedicated police unit – the National Drug Headquarters of the Criminal Police and Investigation Service of the Police of the Czech Republic

- the statistics of public prosecutors' offices and courts prepared by the Ministry of Justice

- information about prosecuted and sentenced offenders from the records of the Probation and Mediation Service and the Prison Service of the Czech Republic.

There is overlap between a number of these datasets, and many of them collect data on all crime rather than being drug-specific. Levels of drug offences will differ between the different sources due to differences in reporting practices, discipline, and methodologies. One interviewee attributes this to the lack of a standardised system of record-keeping between the police, courts, probation service and other criminal justice organisations. According to the interviewee, differences may arise as a result of: entering information on criminal offences and offenders in different stages of the criminal proceedings; different definitions of the cases to be reported and varying statistical units (offenders vs. offences); and duplications in the recorded data (e.g. multiple offences or multiple drug types) and the different methods of reporting them.

The Czech Republic Penal Code recognises four different classifications of crimes in relation to drugs: 1) illegal handling of drugs, including manufacturing, import, export, intermediation of purchase, and sale; 2) possession of drugs for personal use; 3) possession of equipment for the production of drugs; and 4) promotion of use of drugs. For each section of the police code, data are gathered on the number of people prosecuted, charged and sentenced. These drug-related offences are classified according to the:

- type of drugs

- region in the Czech Republic

- type of punishment for these offences.

The above-mentioned data are published in an annual report by the national police drugs headquarters (Czech Republic Police, 2008). This also includes data on drug price and purity which is collected alongside offence data as described below. Data on charged and sentenced persons from the Ministry of Justice are sent internally in special tables and are not made publically available. However, some of these data are also published in the annual report of the Ministry of Justice (Ministerstvo spravedlnosti, 2008). The criminal statistics collated by the police are published online (Ministerstvo vnitra, 2008).

Price and purity data

A range of data is collected on price and purity of seizures by the police national drug headquarters. They accumulate data, from all regional police directorates and from the customs office, which are gathered at the per-offence level and entered into a standardised form. According to an interviewee, this is a relatively unique approach to collecting data for supply-reduction indicators. Instead of just surveying drug offenders, the law enforcers are also asked about the characteristics of the market for different substances. Individual police forces and customs complete a standardised questionnaire and send it to the central headquarters on a monthly basis for each crime/seizure. The data collected in the form is structured as outlined in Table 6.9.

Table 6.9. Information collection by police forces and customs

Date of birth
Gender
Nationality
Reference number
Type of drug involved
Quantity of seized drug
Percentage of active substance
Adulterant/precursors
Price of drug
Proven quantity of drug
Article of criminal code
Modus operandi (production, distribution, import or export)
Stage of criminal proceedings
Place of seizure
Concealment
Seized cash money
Seized property (movable and immovable)
Initiated by
Other remarks

This system was introduced in 2002, but more incomplete records are available for earlier years. A summary of these data is published annually by the police service and made available on the internet at an aggregated level. The results are also sent annually to the Czech focal point, which sends data on to the EMCDDA, and to the UNODC, Europol and Interpol. The data are submitted on an aggregated level and not on a per-offence basis. Data at a more detailed level can also be made available to any police or customs unit as required through informal telephone contact with the national drugs police headquarters. More generally, anyone can petition for detailed data and the national headquarters may also provide specific information upon request to government departments, the focal point and for academic research. This is through a more formal mechanism in which the petitioner writes to request specific information detailing its intended use. However, according to the national drugs police headquarters, the vast majority of more-specific requests come from the police forces that need intelligence to conduct their operations. However, specific data by offence is only stored for one year.

Much of the detail gets lost when the price and purity information is reported to the national focal point. They do not provide cross-correlations, for example, of price and purity. Hence, there is some potential to make more use of the detailed information gathered. The annual data report is used in the design of the police drugs strategy and overall government drugs strategy, and will also contribute to the broader European strategy.

There is one central contact point for the gathering of data from all the separate police forces. This single person has direct telephone contact to all data providers and is responsible for resolving any issues and addressing any queries or investigating late or incomplete data submission. As the table is well standardised, there are not usually significant issues with harmonisation of the data collected. According to interviewees, the close operational contact works well in allowing any issues to be quickly addressed and ensuring the data gathered is timely and consistent. For example, new medicines recently became available which contained pseudoephedrine, but this single contact point allowed the national drug headquarters to rapidly establish what is happening in the field and advise the individual data collection points on the issue. Two interviewees suggested independently that this platform for data collection – the mechanism of direct contact along with the centralised data collection point within the police service – is unique to the Czech system. They also suggest that they have no plans to adjust the data-gathering strategy at their level at present. This is because they have recently made changes to the standard table, so are at present monitoring the impact of these changes.

Price data

Data on prices of different types of drugs are collected by the National Drug Headquarters. The data are collected from all district police headquarters and published in an annual report (Kubů *et al.*, 2000). The average and mode price is monitored for each drug type. The price is based on estimates from district police headquarters. These estimates used to be created by an expert evaluator at the regional/district level every six months, using data-gathering methods such as interviews with drug users and wiretapping, but with no overall fixed method. Since May 2009, the national police drug headquarters have introduced a new system. In this system, the price estimate is made on a case-by-case basis by investigator of that particular case and is included in the standard data table. They feel this better represents the situation in the field.

Additionally, the REITOX 2007 report (Mravčík *et al.*, 2008) cites a questionnaire survey (Oulická, 2008) conducted on pervitin prices in 2007, covering a sample of 63 respondents (clients of low-threshold facilities in Prague) aged 15–53. Among other questions, they were asked about the price of pervitin, the quantities purchased, and the relationship of the buyer with the dealer.

Following a recent meeting in Lisbon[78] to discuss issues related to wholesale drug prices, there may be changes in the way data are collected on price. An interviewee suggested that the key problem is that it is difficult to gather data on wholesale drug prices as so few of the seizures made are of large amounts of drugs (more than 1kg). In fact, they suggest that only around 5 percent of seizures are of this size.

An additional suggestion for the acquisition of EU drug market information made by an interviewee is to organise focus groups with social workers (so-called services workers who are in everyday contact with users, e.g. facilitating needle exchange). These focus groups have been organised by the Task Force in the Czech Republic. These focus groups take

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[78] Identifying Europe's information needs for effective drug policy. EMCDDA/OEDT, 6–8 May 2009, Lisbon.

around 1.5 to 2 hours and are facilitated by a representative from the Task Force. Topics include: purity, price and quality; new people on the street; and new types of drugs.

Purity data

Drug purity data are obtained from both regional laboratories and the Forensic Science Institute in Prague. Purity data are collected on the per sample level for forensic labs by the national drug headquarters, but they are not transferred to the national focal point in a standardised format. As a result, the national focal point suggests that the main difficulty in using these data is that there is not a lot of information about the sample from which a particular purity estimate comes. For any estimate, they do not know which seizure this relates to, its size or its location, and they cannot relate the purity data to price either. The National Monitoring Centre has indicated that it would like to improve the process in this area. According to interviewees, there are issues of coordination between different agencies in order to make this happen.

Seizure Data

Seizure data are collected from both the Police of the Czech Republic and the Customs Administration of the Czech Republic. Police data also include seizures made in cases treated as misdemeanours; that is small quantities for personal use. These data are only significant in the cases of marijuana and pervitin. Seizures which involve more than one drug type are always logged separately in the records of seizures of individual drug types. This means that the total number of seizures is lower than the sum of all seizures by drug type (Mravčík *et al.*, 2008). Data are collated and published annually, with classification of the seizures by drug type and quantity (Kubů *et al.*, 2000).

More detailed information is available on seizures made by the Customs Authority, such as on the location of the seizures, multiple drug types seizures, and direction of transport (e.g. import or export) (Celní správa, 2008).

The National Monitoring Centre on Drugs and Drug Addiction is currently developing recommendations that the division by volume of seizures be adjusted in order to standardise the data with data collected in other European countries. In the longer term, they would also like to build a more joined-up system in which price and purity estimates can be linked to specific seizures and their size and location in order to build a clearer picture of the movement of drugs throughout the Czech Republic and the interdependence of these factors.

In 2006, the Institute for Criminology and Social Prevention investigated the difficulties in gathering seizure data. The study, published in 2008, included a questionnaire survey with 168 experts with a professional background in criminal justice (judges, public prosecutors, officers of the National Drug Headquarters, customs officers, and Prison Service officers). The questionnaire allowed officers from the National Drug Headquarters and Customs to comment on the seizures data collection efforts. The complications which were mentioned as making the work of the professionals in this area difficult included (Trávníčková and Zeman, 2008):

- a drain of experienced and trained staff in connection with the removal of customs inspections at the borders after the accession of the country to the Schengen Convention;

- the disclosure of investigative methods

- the high level of organisation and extensive financial resources of drug-traffickers

- insufficient drug enforcement legislation to facilitate drug-related cases (e.g. the absence of the legal status of a crown witness)

- the fragmentation and poor interconnection of the information databases of cases under investigation between the individual branches of the police and the customs service

- corruption among Aliens and Border Police officers, civil servants, and judges.

Precursors of pervitin

During 2007 and 2008, the State Institute for Drug Control and the Czech Chamber of Pharmacists checked pharmacies with regard to the quantity of medicines containing pseudoephedrine. Legally, a pharmacist cannot supply medicines if they suspect that they may be abused. However, there were no sanctions involved with such provision. It was estimated that 4 million packs of medicines which were used as precursors for pervitin production are estimated to have been sold in Czech pharmacies in 2007 (Svobodová 2008). There are now more legal instruments available to authorities as of May 2009, after the introduction of a new category of restricted medicinal products (mainly targeted at eliminating the sale of licit precursors of pervitin). The pharmacy must record when any of these products is distributed, and this information is stored on a centralised database, and the amount which can be purchased is limited (see Section 6.2.1). Therefore, most precursors are now obtained illegally through couriers from across the border.

Drug-related crime

The Probation and Mediation Service, and the Police collect data on drug-related offences, which include not only drug law offences, but also secondary offences such as property crimes committed under the influence or for the purpose of obtaining drugs. As part of this initiative, the proportion of crime which is drug-related is also estimated.

Retrospective data collection with regard to secondary drug-related crime takes place at the National Drug Headquarters. Data are collected for the previous year and published in the annual report (Czech Republic Police, 2008). These data are accumulated from data collected from the regional directorates of the police force (of which there are 18), and estimates are in fact made at the level of individual police forces. Estimates include the types of crime that are related to drug use, which is used to generate a standard list of crimes which are likely to be drug related; and then, for each crime on this list, the proportion of these crimes which are drug related. These estimates are made by each police force on the basis of their intelligence, using information from interviews with offenders, wiretapping, etc. Estimates of secondary drug-related crime also come from the probation and mediation service, where further estimates are made based on their experience. Inevitably, since these are only estimates, there are issues relating to their accuracy. And since there is no standardised methodology, there are also issues relating to their consistency.

Data on use of drugs among prisoners

Data on drug use in prison are collected by the General Directorate of the Prison Service, which is published in the Annual drugs report (Mravčík *et al.*, 2008). Information is collected on the assistance given to drug users in prison as well as on actual drug use in prison.

There are some caveats involved in this data collection however. Although the level of provision for drug users in prison is fairly straightforward to collect, there is no standardised approach available to estimating the level of drug use in prison. Currently, most estimates are based on the estimates of prison staff. At present, the Directorate General (DG) of the Prison Service suggests that 40 percent of prisoners use drugs. However, according to an interviewee, there are NGOs who work with drug users who estimate that there is a significantly higher level of use – approximately 60–70 percent.

In order to provide a more reliable estimate of prison drug use, the Czech National Monitoring Centre for Drugs and Drug Addiction has planned to conduct a cross-sectional study on drug use by offenders, in collaboration with the prisons DG and the mediation and probation service. The proposed cross-sectional study will consist of a questionnaire for inmates or offenders conducted in collaboration with the employees of Czech prisons and the probation and mediation service (there are about 30–35 prisons in the Czech Republic). Survey design has been difficult as prisoners are vulnerable target subjects, and the data gathering also needs to be confidential. Prisoners will be given a questionnaire and staff will provide instructions on how to fill it out. The completed questionnaire will then be sealed in an envelope and placed in a box for collection. According to some NMCDDA representatives, arranging this new survey has met with some opposition from the Prisons DG. According to one observer, the organisation is relatively conservative, unwilling to rescind control of the data collection, and may also fear potentially damaging results of this survey.

6.2.8 Other data collection initiatives

Data related to health and treatment

There is a number of datasets available providing information on health outcomes of drug use and drug treatment in the Czech Republic. Three of the most important are:

- A nationwide system for reporting treatment demand has been operating in the Czech Republic within the framework of the Hygiene Service since 1995. It gathers data on all treatment cases because of illegal substance abuse (Mravčík *et al.*, 2008).

- An automated system for collection of drug mortality data, which covers all 13 departments of forensic medicine and forensic toxicology, provides information on overdoses on narcotic and psychotropic substances to the Czech national focal point (Mravčík *et al.*, 2008).

- Data are collected by the Institute for Health Information and Statistics, which includes inpatient and outpatient data from medical facilities and the national substitution treatment register.

Academic publications

Academic literature is a final important source of information on the current status of drugs and drug use. Illicit substances is an area of significant research interest in the Czech

Republic, and a lot of information is made available in this way rather than through official institutions. Academic research tends to focus on analysis of data from other sources rather than primary data collection. However, it does make available data that would not otherwise be published. For example, a lot of the data collected by the national police drug headquarters is not published in detail through any official channels, but can be accessed for further analysis by academic institutions.

6.3   Spain

Although alcohol and tobacco are consumed more widely, prevalence of illicit drug use in Spain is relatively widespread, especially among those under 35 (REITOX, 2007). According to data from a 2005 population survey, 28.6 percent of the respondents aged 15–64 reported lifetime use of cannabis, followed by cocaine (7.0 percent), ecstasy (4.4 percent), amphetamines (3.4 percent) and hallucinogens (3.4 percent) (REITOX, 2008).[79] Also according to 2005 data, prevalence of past year use in Spain was 11 percent for cannabis; 0.12 percent for heroin; 3.0 percent for powder cocaine; and 1.7 percent for amphetamines and hallucinogens together (Spanish Drugs Observatory 2007). Survey findings indicate that last month prevalence of cannabis and cocaine use has increased, while trends in the use of crack, ecstasy, amphetamines and hallucinogens seem to have stabilised or decreased in recent years (REITOX, 2008). Data from 2006 have shown a decline from previous years in the use of cannabis, cocaine and stimulants (as well as tobacco) among students aged 14 to 18 (REITOX, 2007).

Aside from a consumer market, however, Spain is an important transit country for illicit drugs entering the European market. In particular, cocaine originating from Latin America and hashish from North-Africa are smuggled into Europe via Spain (REITOX, 2008).

6.3.1   Drug policy background

National Action Plan on Drugs

The Spanish government established a National Action Plan on Drugs (*Plan Nacional sobre Drogas* – PND) in 1985. The action plan and its governing body belong to the Ministry of Health and Consumer Affairs (*Ministerio de Sanidad y Política Social*). The organisational structure includes an Inter-ministerial Group composed of representatives of the Ministries of Health, External Affairs, Home Affairs, Justice, Education and Science, Economics and others. [80]

The PND's remit is the coordination of the different aspects of Spanish drugs policy, from supply-side measures including measures to tackle drug smuggling and money laundering to demand-side measures including prevention and health responses. Supply-side activities are mostly the responsibility of central government and are primarily the remit of the Secretary of State for Security, and its Intelligence Centre against Organised Crime (*Centro de Inteligencia conta el Crimen Organizado* – CICO) based within the Ministry of Home Affairs. The operational units in charge of supply-reduction include the police (*Dirección General de la Policía*), the civil guard (*Guardia Civil*), border control services (*Servicio de Vigilancia Aduanera*), and autonomous and local police (*Policía Autonómica y Local*). Related agencies also include the Commission for the Prevention of Money Laundering

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[79] This population survey of people between the ages of 15 and 64 is conducted every two years. Since 2001, the survey has been in line with EMCDDA recommendations.

[80] The last Spanish National Drugs Strategy, under the coordination of the PND, was for 2000–2008. No Strategy documents for after 2008 could be found on the PND website, but the Strategy for 2009–2016 has been recently approved.

and Financial Infractions (*Comisión de Prevención del Blanqueo de Capitales e Infracciones Monetarias*), based within the Ministry of Economic Affairs (*Ministerio de Economía*).

Much of the demand-side element of the national drug strategy, however, is decentralised and managed within 17 regional action plans on drugs that enjoy a certain degree of autonomy from central government control. According to the national focal point's annual report (Economisti Associati, 2001), data collection and harmonisation processes are often challenged by this decentralised system, which makes these procedures more time-consuming. Furthermore, data collection is dependent on the willingness to cooperate of the central government institutions and those at the regional level, including the regional PND branches.

Specific areas of drug-related legislation and activity

A number of campaigns to prevent drug use are implemented nationally and regionally across Spain. Many of them focus on alcohol, cannabis and cocaine (EMCDDA, 2007). Firstly, an important focus of prevention activity for the central government and the regions are primary and secondary schools, where a number of programmes have been implemented, some based on collaboration between the Ministry of Health and Consumer Affairs (through the PND) and the Ministry of Education. With regards to treatment, activities fall into two broad areas: treatment in the community and treatment in prisons.

Secondly, the law on protection of citizens' security (1992) considers drug consumption, in public as well as illicit possession, as a serious order offence punishable by administrative sanctions. Fines are the usual punishment, but the law foresees that the execution of the fine can be suspended if the person freely attends an official drug treatment programme.

Finally, for trafficking the Spanish law lays down penalties in line with the seriousness of the health damages associated with the drugs and any aggravating and mitigating circumstances that may exist. Penalties can reach up to 20 years in prison, with such long terms reserved for cases with aggravating circumstances such as sale to minors under 18, or the sale of large quantities. When no such circumstances exist, those who have committed the crime can be sentenced to prison for one to three years if the drugs do not cause serious health damage, and from three to nine years when they do. In all cases, a fine is also imposed.

6.3.2   Spain's position in the drug supply chain

Spain is considered a transit country for illicit drugs coming into Europe primarily from Latin America and North Africa. According to information from law enforcement agencies, seized cocaine generally originates from Colombia; an estimated 93 percent of hashish comes from territories under Moroccan control; and heroin comes from Turkey. Synthetic drugs are smuggled into Spain from the Netherlands and Belgium (EMCDDA 2008). A significant majority of seizures, arrests for trafficking and arrests for possession are cannabis-related *(ibid).*

6.3.3   Agencies involved in this data collection

It is clear from the information provided above that a number of agencies and institutions are involved in collecting and reporting on drug-related data and information. Ultimately, most or all of the data are collated and reported by the Spanish Drugs Observatory (*Observatorio Español sobre Drogas*). The observatory, set up in 1997 at PND within the

Ministry of Health and Social Policy, is the permanent body for the collection of information from the different national and international sources. Its basic function is to evaluate the drugs situation in Spain based on the collection and analysis of data from institutions and professionals working in the field of drugs and drug use. The Observatory also acts as the REITOX (national focal) point. The observatory publishes a range of reports every year, including REITOX reports to the EMCDDA.

The Intelligence Centre against Organised Crime (*Centro de Inteligencia contra el Crímen Organizado* or CICO) is the agency that collates relevant data from seizures to construct a number of important supply-side indicators, including price and purity. There are a number of other agencies involved in primary and secondary data collection and reporting in Spain. These are summarised in Table 6.10.

Table 6.10: Agencies involved in data collection and reporting on drug-supply reduction and drug-related crime

Government level	Body involved in data collection
Central government	Spanish Drugs Observatory, within Ministry of Health and Social Policy;
	Intelligence Centre against Organised Crime, part of the Secretary of State for Security, Ministry of Home Affairs (*Centro de Inteligencia contra el Crimen Organizado – CICO*)
	Special Prosecutor for the Prevention and Repression of Illicit Drug Trafficking (*Fiscalía Especial para la Prevención y Represión del Tráfico Ilegal de Drogas*)
	Commission for the Prevention of Money Laundering and Financial Infractions (*Comisión de Prevención del Blanqueo de Capitales e Infracciones Monetarias*)
Autonomous community	Autonomous community governments
Frontline agencies	Courts
	Hospitals and treatment centres
	Autonomous police
	National police and Civil Guard
Other data collection agencies and systems	National Centre for Epidemiology, Carlos III Health Institute, within the Ministry of Health and Social Policy
	National Aids Registry
	National Toxicology Institute
	National Security Studies Office, within the Ministry of Home Affairs (*Gabinete de Estudios de Seguridad Interior –GESI*)
	State Information System on Drug Addiction

6.3.4 Overview of drug-related data and analysis infrastructure in Spain

All the statistical data collected by the PND are publicly available. Much of the information and analysis generated by CICO is circulated only to the pertinent agencies and authorities. We have identified a number of important data collection initiatives in Spain that generate information relevant for drug-supply reduction or drug-related crime, these comprise the:

- prisoners survey

- population survey

- state survey on drug use, carried out in secondary schools

- drug supply indicators

- harm-reduction and treatment data.

These initiatives are discussed in more detail in the following sections.

6.3.5   **Prisoners survey**

The PND, within the Ministry of Health and Social Policy, conducted a survey among prisoners in Spain in 2006, to examine drug use and overall health status. This survey appears to have been a one-off rather than a recurrent study. The survey showed that prisoners have significantly higher rates of drug, alcohol and tobacco use (both while in prison and outside) than the general population. It is also worth noting that this survey was only carried out once, but given the important and policy-relevant information it can provide, it begs the question of why this survey is not conducted on a regular basis.

6.3.6   **Household Survey on Alcohol and Drugs**

The PND coordinates a population survey, conducted every two years since 1995. This is called the Programme of Household Survey on Alcohol and Drugs in Spain (*Programa de Encuestas Domiciliarias sobre Alcohol y Drogas en España – EDADES*). This survey of people aged 15–64 living in homes[81] aims to understand the prevalence of drug use; key socio-demographic characteristics of users; patterns of use; and the perceptions of the population of drugs and drug problems. The survey includes questions on: drug use in lifetime, last year and last month; prevalence of injecting drug use; perception of ease of access to different types of drugs; perceptions of harms of drug use; and preceptions of drug policies' effectiveness. The 2009 round of this survey introduced questions about the impact of drug use on employment outcomes.

6.3.7   *State survey on drug use in secondary schools*

The PND conducts a survey of school children aged 14–18, every two years since 1994, the State Survey on Drug Use in Secondary Schools (*Encuesta Estatal sobre Uso de Drogas en Enseñanzas Secundarias – ESTUDES*). The main aims of the survey are to:

- assess the rate of consumption of the various psycho-active drugs (including illicit drugs, tobacco and alcohol)

- examine the most important socio-demographic characteristics of drug users

- investigate certain relevant usage patterns

- gather information on opinions, knowledge, perceptions and attitudes towards certain aspects related to drug abuse (perceived availability, perceived risk given various usage behaviours), and certain factors related with drug use

- estimate the degree of exposure and receptiveness of students to certain interventions.

Questions include drug, alcohol and tobacco use in lifetime, last year, last month; age of first use; perception of risk from drug use; and perception of ease of access to different types of drugs.

6.3.8   **Data on drug-related harms**

A number of PND reports present data on drug-related harms, most notably deaths caused by an acute reaction after using psychoactive drugs, and HIV infection rates. The primary data on drug-related mortality, for people aged 10 to 64, is typically obtained from court records assembled by the autonomous regions and cities, and reported to the Spanish

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[81] Prisoners, and those living in student housing, hostels and on the streets, etc are not included.

Drugs Observatory (see for example REITOX, 2007). Data on HIV infections is obtained from the National Centre for Epidemiology, Carlos III Health Institute (*ibid.*), and reported to the National AIDS Registry in the Ministry of Health and Social Policy.

Other drug-related health harms, such as a hepatitis infection, emergency room admissions related to non-medical and non-therapeutic use of drugs, and risk behaviour including sharing needles and not using a condom, are also reported. According to the latest available REITOX report to the EMCDDA (2007), data on risk behaviour were obtained from a survey in 2003–4 of people admitted for treatment (*ibid.*). The first, and only other, such survey had been conducted in 1996. Data on drug-related emergency room admissions are at present not collected from every autonomous community, as the PND information system that would enable this has not been implemented uniformly across the country. Coverage for this indicator has been estimated at about 50 percent nationwide. Data on drug-related accidental deaths is also recorded by the National Toxicology Institute, which collects this information every year since 1998 (*ibid*).

Sources from the Ministry of Health indicated that the numbers of people on drug treatment and prevalence of harmful and hazardous alcohol consumption had been identified as areas on which more information is needed. As a result, a register on admissions to drug treatment was introduced earlier in 2009 and a module on harmful and hazardous alcohol consumption will be incorporated shortly into the EDADES survey.

6.3.9 Data collection on supply-side issues

Because of Spain's important position as a gateway to Europe for hashish and cocaine, the PND collects and reports on a significant number of supply-side issues. The two key reports include annual PND reports and reports from the National Drugs Observatory.[82] Additionally, the PND publishes special reports on certain illicit drugs, including cocaine, cannabis and synthetic drugs, as well as alcohol. Most supply-side data are collected by CICO and include indicators of police action against drug-trafficking (*Ministerio de Sanidad y Consumo*, 2006). These indicators are summarised in Table 6.11.

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[82] PND reports are called *Memorias* and are produced every year from 1996, although the last one available on the PND website is for 2006. The National Drugs Observatory reports exist for most years between 1998 and 2007.

Table 6.11: Supply-side data collection by CICO

Indicators
• Number of seizures
• Quantity of drugs seized
• Drug-related/trafficking arrests (including data on nationality, sex, age and other details)
• Police reports of violations of law on possession and use of drugs
• Growth and production of drugs
• Means and routes of distribution
• Price[83]
• Purity
• Cutting agents.

While CICO is the agency collating all drug-supply related data, the primary data comes from the police forces and border control agencies that carried out the seizures. CICO collates information on every seizure in Spain, as well as in territorial and international waters. Data on overall drug-related crime are synthesised by the National Security Studies Office, also part of the Ministry of Home Affairs (*Gabinete de Estudios de Seguridad Interior – GESI*).

Data on price and purity are in the first instance determined by the National Central Office of Drugs (*Oficina Central Nacional de Estupefacientes – OCNE*), also located in the Ministry of Home Affairs. Purity for each seizure, however, is established by one of the approximately fifty forensic laboratories in the different provinces. Most of the indicators listed above (particularly seizures, quantities, and people arrested and reported) are collated in a database run by CICO.[84] Although purity-adjusted prices do not appear to be routinely and systematically collected in Spain, CICO representatives believe that all data necessary to tackle the drugs problem is Spain are currently collected in the country.

A final set of supply-side indicators involves data collection, from the Special Prosecutor for the Prevention and Repression of Illicit Drug Trafficking, on judicial processes against drug-related offences; and data on drug-related money laundering, from the Commission for the Prevention of Money Laundering and Financial Infractions. These data are also ultimately aggregated by CICO in the Ministry of Home Affairs.

6.3.10 Harm-reduction and treatment data

The autonomous regions and cities report information to the PND about numbers of drug users in treatment as well as methadone treatment. The regions in turn receive primary data from hospital detoxification/withdrawal units, therapeutic communities, outpatient assistance centres and other agencies. These data are reported to the PND through the State Information System on Drug Addiction (*Sistema Estatal de Información sobre Toxicomanías – SEIT*). This system of treatment data collection has been implemented in

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[83] According to information sent to us by CICO representatives, recent price estimates indicate that during 2008, average prices were: €34,474 per kilo of heroin; €6.59 per gram of heroin; €33,122 per kilo of cocaine; €60.03 per gram of cocaine; €1,416.50 per kilo for hashish resin; €4.78 per gram of hashish resin; and €750.50 per kilo of marihuana and €3.09 per gram of marihuana.

[84] In addition to these, there are anatomical-forensic labs (*laboratorios anatómico-forenses*) which depend on the National Institute of Toxicology and Forensic Science of the Ministry of Justice. These are in the cities of Madrid, Barcelona, Seville and Santa Cruz de Tenerife. Finally, there are also the forensic crime labs of the state security agencies, which conduct forensic analysis in the investigation of criminal cases.

all autonomous communities. Primary data on users assisted through harm reduction initiatives are obtained by those bodies administering the initiative in the first instance (pharmacies, mobile units, safe injection rooms and others). These data are subsequently reported to the PND as well. Finally, information on treatment or harm reduction programmes in prison (such as needle exchange programmes) is collected by the General Directorate of Penitentiary Institutions (*Dirección General de Instituciones Penitenciarias*).

6.4   Conclusions

We have studied the data collection and reporting mechanisms in the field of drugs supply and drug-related crime in three countries to better understand the unique features, strengths and potential limitations in these Member States. The case studies provide a snapshot of the type of information that is collected and potentially available to analyse illicit drug markets and associated crime. We delineate the mechanisms through which data are collected, by whom, for whom it is accessible and how these data are being used.

The case studies show that the driving force behind the collection and particularly aggregation of drug market data is often the national focal point. This is an artefact of the REITOX network, implemented to report to the EMCDDA on a periodic basis. The institutional embedding of these national focal points deviates by country. In Spain and the United Kingdom, the focal points are located at the Departments of Health, while in the Czech Republic, the national focal point is located in the National Monitoring Centre for Drugs and Drug Addiction operated by the secretariat of the Council of the Government for Drug Policy Coordination, a government agency represented by all ministries involved in drug policy as well as representatives of civil society associations. The annual reports of these national focal points are rich sources of up-to-date albeit highly aggregated information about the drug situation in these countries.

6.4.1   Lessons for demand-side data collection

Data collection on the drugs situation in Europe is particularly well-developed for the demand-side of the market. The data that is compiled by the national focal points and other agencies provide policymakers with crucial information that can be used to evaluate the effectiveness of a plethora of policies and programmes intended to reduce drug use and related harms throughout Europe. Data on the prevalence of drug use among the population are typically collected and made available by the health ministries in these countries. The ESPAD survey, for example, provides a standardised picture of drug use among young people in the EU. Problem drug use is also an area of increasing interest. It is often investigated through surveying the number and characteristics of people in treatment; for example, in the United Kingdom, which has the highest levels of problem illicit drug use in Europe, the UK's National Drug Treatment Monitoring System does this. In the Czech Republic, general practitioners are also used to generate information about problem drug use.

6.4.2   Lessons for supply-side data collection

The development of measures capturing dimensions of the supply of different illicit substances, however, has received considerably less attention. But it is becoming a field of increasing interest in the three case study countries. Various law enforcement agencies frequently report information on seizures, arrests and, less frequently, on purity and price. But current data collection efforts are insufficient to support careful analyses of these markets in a manner that would enable one to understand the effect of specific supply-side strategies. The case studies have shown that a wealth of supply-side data is collected by enforcement agencies. The primary data on seizures are collected by the police forces and border control agencies that carry out the seizures. Seizure samples are often sent to forensic laboratories, to be tested for purity, although there is no uniform protocol to

create a representative sample and avoid selection biases. Consequently, highly-aggregated statistics are provided to a central government agency, typically the home office, where high-level figures are interpreted and published. In the United Kingdom, data on seizures are collated by the Home Office and SOCA reports on the number of 'interdictions'. In Spain, CICO is the agency responsible for all drug-supply related data collection. Consequently, data on price and purity are aggregated by the National Central Office of Drugs, also located in the Ministry of Home Affairs. In the Czech Republic, finally, the police national drugs headquarters collects a range of data on price and purity of seizures from all regional police directorates and from the customs office. The Police service has a centralised drugs data gathering unit. One single person is responsible for this data and maintains direct contact with all data providers.

Although at the law-enforcement level there are data on price and purity of seizures available at the seizure level, this information is not widely used in the case study countries to inform supply-reduction policy. Reports to the EMCDDA and other international organisations only include summaries of aggregated results. While price and purity data seem to be collected in all case study countries, purity-adjusted prices do not appear to be estimated at aggregated level. Our enquiries suggest that information held by individual police forces and by national agencies such as SOCA, CICO or the Czech police national headquarters, which is not currently made publically available, might be a rich source of data which is currently untapped.

In addition to arrestee surveys and seizure information, there are other types of intelligence relevant to supply-reduction policy that police forces and customs may provide. In the Czech Republic, for example, the personal experience of police and customs are captured through a standardised questionnaire.

The emphasis of data collection initiatives in the case study countries reflects their position in the drug supply chain to a certain extent. In the Czech Republic, for example, a significant amount of the drugs taken in the Czech Republic are produced in-country, and it is an exporter of methamphetamines (pervitin). While precursors of pervitin can be purchased legally, sales records from pharmacies are now being tracked in order to monitor the disappearance of large quantities into the hidden economy. This tracking system of licit precursors can be useful for a broader context. However, for this system to be truly effective, it should be expanded internationally, as producers have shifted to importing precursors from nearby countries.

6.4.3 Lessons for drug-related crime data collection

Of the three case study countries, the UK seems to have a specific interest in measuring drug-related crime. The difficulties of monitoring, quantifying and measuring crimes associated with the different stages in the drug supply chain are widely acknowledged, however. Tracking offences seems to be the most feasible mechanism of data collection. Official statistics from the criminal justice system, relating to recorded crime, arrests, prosecutions and sentencing provide information about those offences and offenders formally processed by the system for drug law violations. These statistics are often not disaggregated by type of drug or offence. In the UK, however, they are at least governed by standards that aim to encourage consistency in recording practices across the UK. They are

typically available in the public domain from the Home Office or Ministry of Justice web sites.

Official criminal justice statistics are supplemented by surveys of householders, young people and arrestees, the results of which shed light on patterns of drug use and on some activities that are not formally processed by the criminal justice system. Data collected by treatment agencies also provide insight into drug taking behaviours.

Surveying arrestees on their criminal behaviour is the most promising avenue of data collection from a methodological perspective. The NEW-ADAM programme, for instance, provided critically important information for estimating the size of the drugs market in the UK and for understanding the relationships between drug use and crime. In Spain, a very informative prisoners' survey was conducted in 2006 that provided information about links between criminal behaviour and drug use.

However, experiences show that there is a myriad of practical and administrative limitations as well as selection biases associated with these types of surveys. Without exception the undertaking to survey arrestees, convicts or prisoners was dropped sooner or later. Experiences from countries beyond the three case studies (e.g. in the Netherlands) seem to confirm these difficulties.

Table 6.12: Interviews for and contributions to case studies.

Contributor	Position and affiliation	Interview date
United Kingdom		
Keith Bolling	Senior Associate Director, British Market Research Bureau	8 April 2009
Richard Boreham	NatCen	31 March 2009
John Marais	Evidence and Analysis Unit, Office for Criminal Justice Reform, Home Office	2 April 2009
Chris Kershaw	Home Office, RDS	21 April 2009
Dave Evans	Border Force Intelligence, UK Border Agency	19 May 2009
Les King	Forensic Science Service	21 April 2009
Shona Morrison	Force Drugs Coordinator, Thames Valley Police	15 April 2009
Czech Republic		
Tomas Zábranský	Center for Addictology, Charles University, Prague	6 July 2009
Bretislav Brejcha	Police National Drug Headquarters	3 July 2009
Ales Borovicka	Department of international relations NDH	3 July 2009
Martina Kaprová	National Focal Point NDH	3 July 2009
Viktor Mravčík	National Monitoring Centre for Drugs and Drug Addiction	Written contributions
Roman Pesek	National Monitoring Centre for Drugs and Drug Addiction	24 June 2009
Spain		
Multiple contributors	Plan Nacional Sobre Drogas, Ministerio de Salud y Politica Social	Written contributions
Multiple contributors	CICO (Intelligence Centre against Organized Crime), Ministerio del Interior	Written contributions

REFERENCES

Reference list

Angrist, J. D., G. W. Imbens, and D. B.Rubin, Identification of Causal Effects using Instrumental Variables. *Journal of the American Statistical Association*. 91, 444–55, 1996.

Abt Associates, Inc., *What America's users spend on illegal drugs 1988-2000*, Washington, DC: Office of National Drug Control Policy, 2001.

Anderson, J. H. and C. W. Gray, *Anticorruption in Transition 3: Who Is Succeeding ...and Why?* Washington, DC: The World Bank. 2006.

Arkes J., R. L. Pacula, S. M. Paddock, J. P. Caulkins and P. Reuter, 'Why the DEA STRIDE Data are Still Useful for Understanding Drug Markets', *National Bureau of Economic Research Working Paper* #14224, 2008. Also available for download at http://www.nber.org/papers/w14224.

Arkes, J. R. Pacula, S. Paddock, J. P. Caulkins and P. Reuter, Office of National Drug Control Policy, *Technical Report for the Price and Purity of Illicit Drugs: 1981 through the Second Quarter of 2003*, Report prepared by RAND and published by the Office of National Drug Control Policy, Washington, DC: Executive Office of the President, 2004.

Bank, W., Anti corruption in Transition 3: World Bank, 2006.

Bennett T. and K. Holloway, *Understanding Drugs, Alcohol, and Crime*, McGraw Hill International, 2005.

Bennett, T. and K. Holloway, The Causal Connection between Drug Misuse and Crime. *British Journal of Criminology, 49*(4), 513–31, 2009.

Bennett, T. and R. Wright., 'he Impact of Prescribing on the Crimes of Opioid Users', *British Journal of Addiction* 81 (2):265-73, 1986.

Blickman, T., *The Ecstasy Industry Exploring the Global Market*, Transitional Crime & Globalisation Amsterdam, Holland: TNI Briefing Series, 2004.

Boreham, R., A. Cronberg, L. Dollin and S. Pudney, *The Arrestee Survey 2003, 2007*. Available at http://www.homeoffice.gov.uk/rds/pdfs07/hosb1207.pdf (as of 17 September 2009).

Braun, N., Drug Policies, Prices, and Wealth, *European Societies*, 2(1), 51–64, 2000.

Bretteville-Jensen, A. L. and M. Sutton, 'The Income-generating Behaviour of Injecting Drug-users in Oslo', *Addiction* 91 (1):63-79, 1996.

Brook, J.S., M. Whiteman, P Cohen, J. Shapiro and E. Balka, 'Longitudinally Predicting Late Adolescent and Young Adult Drug Use: Childhood and Adolescent Precursors', *Journal of the American Academy of Child and Adolescent Psychiatry*, 34 (9):1230-1238, 1995.

Brown, M. and K. Bolling, *Drug Misuse in Scotland: Findings from the 2006 Scottish Crime and Victimisation Survey.* Edinburgh: Scottish Government, 2007. Available at: http://www.scotland.gov.uk/Resource/Doc/198856/0053157.pdf. (as of 17 September 2009).

Caulkins, J. P. and Padman. R., 'Quantity Discounts and Quality Premia for Illicit Drugs', *The Journal of the American Statistical Association* 88 (423):748-57, 1993.

Caulkins, J. P. 'Domestic Geographic Variation in Illicit Drug Prices', *The Journal of Urban Economics*, 37 (1):38-56, 1995.

Caulkins, J. P., 'Modeling the Domestic Distribution Network for Illicit Drugs', *Management Science* 43 (10):1364-71, 1997.

Caulkins, J. P., 'Price and Purity Analysis for Illicit Drug: Data and Conceptual Issues', *Drug and Alcohol Dependence* 90 (6):S61-8, 2007.

Caulkins, J. P., 'The Relationship between Prices and Emergency Department Mentions for Cocaine and Heroin', *American Journal of Public Health* 91 (9):1446-8, 2001.

Caulkins, J. P., C. P. Rydell, S. S. Everingham, J. Chiesa and S. Bushway, *An Ounce of Prevention, a Pound of Uncertainty: The Cost-Effectiveness of School-Based Drug Prevention Program*, Santa Monica, CA: RAND, 1999.

Caulkins, J. P., *Developing Price Series for Cocaine*, Santa Monica, CA: RAND. 1994.

Caulkins, J. P., H. Burnett and E. Leslie, 'How Illegal Drug Enter and Island Country: Insights from Interviews with Incarcerated Smugglers', *Global Crime* 10 (1):66-93, 2009.

Caulkins, J., Commentaries on Cunningham *et al.*, *Addiction*, 104(3), 454–55, 2009.

Caulkins, J.P., 'What is the Average Price of an Illicit Drug?', *Addiction* 89 (7):815-819,1994.

Caulkins, J.P., R. L. Pacula, J. Arkes, P. Reuter, S. Paddock, M. Iguchi and J. Riley, *The Price and Purity of Illicit Drugs: 1981 through the Second Quarter of 2003*, Report prepared by RAND and published by the Office of National Drug Control Policy, Washington DC: Executive Office of the President, 2004.

Caulkins, Jonathan P. and Peter Reuter 'What Price Data Tell Us About Drug Markets,' *Journal of Drug Issues*. Vol. 28, No. 3, 593–612, 1998.

Caulkins, Jonathan P., Peter Reuter and Lowell J. Taylor, 'Can Supply Restrictions Lower Price? Violence, Drug Dealing and Positional Advantage,' *Contributions to Economic Analysis & Policy*, Vol. 5(1), 2006.

Celní správa ČR, 2008. Informace o výsledcích činnosti Celní správy ČR za rok 2007. http://www.cs.mfcr.cz/CmsGrc/Tiskove-centrum/Vyrocni-zpravy/. Retrieved on 28 August 2008.

Chepesiuk, R., *The War on Drugs: An International Encyclopedia*, Santa Barbara, CA: ABC-CLIO, 1999.

Corman, Hope, and Naci Mocan, 'A Time-Series Analysis of Burglary, Deterrence and Drug Abuse in New York City', *American Economic Review*, XC, 584–604, 2000.

Council of the European Union (2001) Alignment of law enforcement drug statistics. 12411/1/01 STUP 26. 30 October 2001. Available at: http://register.consilium.europa.eu/pdf/en/01/st12/st12411-ad01.en01.pdf. (as of 10 February 2010).

Csémy, L., Chomynová, P. and Sadílek, P., ESPAD 07: Evropská školní studie o alkoholu a jiných drogách, Česká republika 2007. Přehled hlavních výsledků za rok 2007 a trendů za období 1995 až 2007. Praha: Úřad vlády České republiky, 2008

Csémy, L., Lejčková, P., Sadílek, P. and Sovinová, H., ESPAD: souhrn výsledků 1995, 1999 a 2003, 2006. Unpublished results of the study. Cited in Mravčík *et al.,* 2006.

Csémy, L., Zkušenosti mládeže s užitím nelegálních drog - výsledky studie HBSC v ČR. NB, 2007. Unpublished study, results discussed in Mravčík *et al.*, 2008.

CVVM (2009) Public Opinion Research Centre of the Institute of Sociology of the Academy of Sciences of the Czech Republic. Website. Available at: http://www.cvvm.cas.cz. (as of 17 September 2009).

Czech Republic Police, Annual Report of National Drug Headquarters 2008. Available at http://www.policie.cz/clanek/narodni-protidrogova-centrala-skpv-prezentace-utvaru.aspx. (as of 17 September 2009).

Dave, D., 'The effects of Cocaine and Heroin Price on Drug Related Emergency Department Visits', *Journal of Health Economics* 25 (2):311-33, 2006.

Department of Health, Social Services and Public Safety, Drug Prevalence Survey 2006/07 in Northern Ireland, 2007. Available at http://www.dhsspsni.gov.uk/index/stats_research/public_health/statistics_and_research-drugs_alcohol-2.htm as of 22/04/09 (as of 17 September 2009).

DeSimone, J. and M. Farrelly, 'Price and Enforcement Effects on Cocaine and Marijuana Demand', *Economic Inquiry* 41 (1):98-115, 2003.

DeSimone, J., 'The Effect of Cocaine', Prices on Crime. *Economic Inquiry* 39 (4):627-43, 2001.

Dijk, J. van, *The World of Crime: Breaking the Silence on Problems of Security, Justice and Development Across the World*, London: Sage Publications, 2007.

Dijk, J.J.M. van, J.N. van Kesteren and P. Smit, *Criminal Victimisation in International Perspective, Key findings from the 2004-2005 ICVS and EU ICS*, The Hague: Boom Legal Publishers, 2008.

Dijk, J.J.M. van, R. Manchin, J.N. van Kesteren and G. Hideg. T*he Burden of Crime in the EU, A Comparative Analysis of the European Survey of Crime and Safety (EU ICS) 2005*, Brussels: Gallup Europe, 2007.

Dobkin, C. and N. Nicosia, 'The War on Drugs: Methamphetamine, Public Health, and Crime', *American Economic Review* 99 (1):324-49, 2009.

Economisti Associati, Evaluation of the Focal Points of the European Information Network on Drugs and Drug Addiction, 2001.

EMCDDA, *Annual report 2008: The state of the drugs problem in Europe*, Luxembourg: Office for Official Publications of the European Communities, 2008. Available at: http://www.emcdda.europa.eu/publications/annual-report/2008 (as of 17 September 2009).

EMCDDA, *Country Overview: Spain*, 2008. Available at: http://www.emcdda.europa.eu/publications/country-overviews/es (as of 17 September 2009).

EMCDDA, *EMCDDA 2007 Selected Issue – Cocaine and crack cocaine: a growing public health issue*. Luxembourg: Office for Official Publications of the European Communities. 2007.

EMCDDA, *Spain: New Development, Trends and In-depth Information on Selected Issues*, 2007 (2006 data), National report to the EMCDDA, Portugal.

EMCDDA–Europol Joint Publications, *Methamphetamine: A European Union Perspective in the Global Context*, Luxembourg: Office for Official Publications of the European Communities, 2009.

Europol, *European Organized Crime Threat Assessment 2005*, The Hague: European Police Office, 2005a.

Europol, *Drugs 2006*, The Hague: European Police Office., 2006a.

Europol, *European Organized Crime Threat Assessment 2006*, The Hague: European Police Office, 2006b.

Europol, *OCTA 2008: European Organized Crime Threat Assessment*, The Hague: European Police Office, 2008

Europol, *Project COLA: European Union Cocaine Situation Report 2007*, Luxembourg: Office for Official Publications of the European Communities, 2007.

Europol, Project COLA: European Union Cocaine, Situation Report 2007. Luxembourg: Office for Official Publications of the European Communities, 5 September 2007.

Europol, Serious Crime Overview: Drugs 2006. Luxembourg: Office for Official Publications of the European Communities, March 2006. http://www.europol.europa.eu/publications/Serious_Crime_Overviews/drugs2005.pdf (as of 17 September 2009).

Everingham, S.S., C.P. Rydell and J.P. Caulkins, *Modeling the Demand of Cocaine*, Santa Monica: RAND, 1994.

Fagan, J. and Ko-lin Chin, 'Violence as Regulation and Social Control in the Distribution of Crack,' in Drugs and Violence, De La Rosa, M., E. Lambert and B. Gropper (eds.), *National Institute on Drug Abuse Research Monograph Series*, LIII, 8–43, 1991.

Fagan, J. E. 'The Political Economy of Drug Dealing among Urban Gangs,' in *Drugs and Community*, Robert Davis, Arthur Lurigio, and Dennis Rosenbaum, (eds.), Springfield, IL: Charles Thomas, 19–54, 1993.

Fagan, J.A. 'The Political Economy of Drug Dealing among Urban Gangs' in R. Davis, A. Lurigio, and D. P. Rosenbaum (eds), *Drugs and Community*, Springfield, IL: Charles Thomas, 1993.

Fagan, Jeffrey, 'Intoxication and Aggression,' Crime and Justice, A Review of Research, Michael Tonry and James Q. Wilson, eds, Chicago, IL: The University of Chicago Press, 1990.

Felab-Brown, V., 'Afghanistan: When Counternarcotics Undermines Counterterrorism', *The Washington Quarterly* 28 (4):55-72, 2005.

Fergusson, David and John Horwood, 'Early Onset Cannabis Use and Psychosocial Adjustment in Young Adults', *Addiction*, XCII (1997), 279–96, 1997.

Fijnaut, C., 'International Police Action in Europe: Opportunities and Prospects' in *Comparative Police Systems and Cooperation*, 1993.

French, M. T., K. E. McCollister and D. Reznik, 'The Cost of Crime to Society:New Crime-Specific Estimates for Policy and Program Evaluation' under review.

Gamella, J. F. and M. L. Jimenez Rodrigo, 'Multi-national Import-export Venues: Moroccan Hashish into Europe through Spain', in Rödner Sznitman, S. *et al.* (ed.), A Cannabis Reader: Global Issues and Local Experiences, European Monitoring Centre for Drugs and Drug Addition, Lisbon, 2008.

Goldstein, P., 'The Drug/Violence Nexus: A Tripartite Conceptual Framework', *Journal of Drug Issues* 15 (4):493–506, 1985.

Gorman, Dennis and Helene White, 'You Can Choose Your Friends, but Do They Choose Your Crime? Implications of Differential Association Theories for Crime Prevention Policy', Crime and Public Policy: Putting Theory to Work, Hugh Barlow, (ed.) Boulder, CO: Westview, 1995.

Gossop, M., J. Marsden, Stewart. D. and T. Kidd, 'NTORS at One Year: The National Treatment Outcome Research Study' in *Changes in Substance Use, Health and Criminal Behaviour One Year after Intake.* London: National Addiction Centre, 1998.

Grogger, J. and M. Willis, 'The Emergence of Crack Cocaine and the Rise in Urban Crime Rates', *The Review of Economics and Statistics* 82 (4):519-29, 2000.

Grossman, M. and F. J. Chaloupka, 'The Ddemand for Cocaine by Young Adults: A Rational Addiction Approach', *Journal of Health Economics* 17 (4):427-74, 1998.

Gruszczynska, B. and M. Gruszczynski, 'Crime in Enlarged Europe: Comparison of Crime Rates and Victimization Risks', *Transition Studies Review* 12 (2):337-45, 2005.

Hawkins, J. D., R Catalano, F. and J. Y. Miller, 'Risk and Protective Factors for Alcohol and Other Drug Problems in Adolescence and Early Adulthood: Implications for Substance Abuse Prevention' *Psychological Bulletin* 112 (1):64-105, 1992.

Hibell, B. and B. Andersson, *The ESPAD Project Purpose, target population, data collection, economy and governance.* Stockholm: ESPAD, 2006. Available at http://www.espad.org/documents/Espad/Documents/The_ESPAD_History.pdf. (as of 17 September 2009).

Hibell, B., U. Guttormsson, S. Ahlström, O. Balakireva, T. Bjarnason, A. Kokkevi *et al., The 2007 ESPAD Report Substance Use Among Students in 35 European Countries.* Stockholm, Sweden: The Swedish Council for Information on Alcohol and Other Drugs (CAN), 2009. Available at http://www.espad.org/espad-reportsb (as of 17 September 2009).

Hirschi, T. and M. T Gottfredson. 'Towards a General Theory of Crime', in W. Buikhuisen and S. A. Mednick. Leiden (eds), Explaining Criminal Behaviour: Interdisciplinary Approaches,

New York: E.J. Brill, 1988.

HM Government, *Drugs: Protecting Families and Communities: The 2008 Drug Strategy.* London: HMSO, 2008.

HM Government, *Tackling Drugs Changing Lives. Delivering the Difference.* London: Home Office, 2004.

HM Government, *Tackling Drugs to Build a Better Britain: The Government's Ten-year Strategy for Tackling Drugs Misuse.* London: HMSO, 1998.

HM Government, *Tackling Drugs Together: A strategy for England 1995–98.* London: HMSO, 1995.

HM Government, *Updated Drugs Strategy.* London: HMSO, 2002.

Home Office, *Review of Drug Seizure and Offender Statistics.* National Statistics Quality Review Series, Report No.29. Available at: www.ons.gov.uk/...statistics/.../nsqr-series-report-no-29---review-of-drug-seizure-and-offender-statistics.doc, (as of 10 February 2010)

Horowitz, J., 'Should the DEA's STRIDE Data Be Used for Economic Analysis of Markets for Illegal Drugs?' *Journal of the American Statistical Association* 96 (456):1254-71, 2001.

Hough, M. *et al.*, *A Growing Market: the Domestic Cultivation of Cannabis*, Joseph Rowntree Foundation, UK, 2003.

Hyatt, R. and W. Rhodes, *Price and Purity of Cocaine: The Relationship to Emergency Room Visits and Deaths, and to Drug Use Among Arrestees*, Washington, D.C.: Office of National Drug Control Policy, 1992.

Hyatt, R.R. and W. Rhodes, 'The Price and Purity of Cocaine: The Relationship to Emergency Room Visits and Deaths, and to Drug Use Among Arrestees', *Statistics in Medicine* 14 (5):655-68, 1995.

IHIS CR, Institute of health information and statistics of the Czech republic (IHIS CR), 2009. Website. Available at: http://www.uzis.cz/ (as of 25 September 2009).

Imbens, G., J. Angrist and D. Rubin, 'Identification of Causal effects Using Instrumental Variables', *Journal of Econometrics* 71 (1-2):145-60, 1996.

Institute for Defense Analyses, *Technical Report for the Price and Purity of Illicit Drugs: 1981 – 2007*, 2008 [cited October 7, 2009]. Available from http://www.ondcp.gov/publications/price_purity_tech_rpt/price_purity_tech_rpt07.pdf.

International Narcotics Control Board, *Report of the International Narcotics Control Board for 2008.* Vienna: United Nations Publications, 2009.

Jansen, A. C. M., 'The Economics of Cannabis-Cultivation in Europe', Paper presented at the 2nd European Conference on Drug Trafficking and Law Enforcement, Paris, 26 and 27 September, 2002.

Jarvis, G. and H. Parker, 'Young Heroin Users and Crime: How do the 'New Users' Finance their Habits?' *British Journal of Criminology* 29 (2):175-185, 1989.

Jessor, Richard and Shirley Jessor, *Problem Behavior and Psychosocial Development: A Longitudinal Study of Youth*. New York: Academic Press, 1997.

Jofre-Bonet M. and J. L. Sindelar, 'Drug Treatment as a crime Fighting Tool', National Bureau of Economic Research Working Paper #9038, July 2002.

Kilmer, B. and R. L. Pacula, *Estimating the size of the global drug market: A demand-side approach*, Santa Monica, CA: RAND, 2009.

Kleiman, M.A.R, 'The Problem of Replacement and the Logic of Drug Law Enforcement', *Drug Policy Analysis Bulletin* 3:8-10, 1997.

Kleiman, M.A.R. and A. Hawken, *Fixing the Parole System*, 2008 [cited October 2, 2009]. Available from http://www.issues.org/24.4/kleiman.html.

Knack, S., 'Measuring Corruption in Eastern Europe and Central Asia: A Critique of Cross-country Indicators', World Bank Policy Research Working Paper No. 3968: The World Bank, 2006.

Knack, S., *Measuring Corruption in Eastern Europe and Central Asia: A critique of Cross-Country Iindicators* (World Bank Policy Research Working Paper No. 3968): The World Bank, 2006.

Korf, D., 'An open front door: the coffee shop phenomenon in The Netherlands', in Rödner Sznitman, S. *et al.* (ed.) (2008) A Cannabis Reader: Global Issues and Local Experiences, European Monitoring Centre for Drugs and Drug Addition, Lisbon, 2008.

Kriener, H. R. Billeth, C. Gollner, S. Lachout, P. Neubauer and R. Schmid,'An Inventory of On-site Pill-testing Inerventions in the EU', Scientific Report published by EMCDDA,in *Scientific Report*, Lisbon, Portugal: European Monitoring Centre for Drugs and Drug Addiction, 2001.

Kubů, P., E. Křížová and L. Csémy, Anketa semtex dance 2000, pp. 24–30. Praha: imédia s.r.o, 2000.

Kubů, P., K. Škařupová and L. Csémy, Tanec a drogy 2000 a 2003: Výsledky dotazníkové studie s příznivci elektronické taneční hudby v České republice (Dance and drugs 2000 and 2003 – Results of the questionnaire survey in fans of electronic dance music in the Czech Republic) (1st ed.). (Výzkumná zpráva No. 2). Praha: Úřad vlády ČR, 2006.

Lakhdar, C. B., *The Determinants of the Cannabis Pricing: Between Credence, Brand Name and individual Characteristics of Users* , presentation at the 2009 ISSDP Conference. In Third Annual Conference of the International Society for the Study of Drug Policy. Vienna, 2009.

Leggett, T. and T. Pietschmann, 'Global Cannabis Cultivation and Trafficking', in Rödner Sznitman, S. *et al.* (ed.) *A cannabis reader: global issues and local experiences*, European Monitoring Centre for Drugs and Drug Addition, Lisbon, 2008.

Lynch, J. P., 'Problems and Promises of Victimisation Surveys for Cross-National Research,' *Crime and Justice* 34: 229–87, 2006.

Maag, V., 'Decriminalisation Of Cannabis Use in Switzerland from an International Perspective: European, American and Australian Experiences'*, International Journal of Drug Policy* 14, 279–81, 2003.

MacCoun, R., B. Kilmer and P. Reuter, Research on drug-crime linkages: The next generation, 2003. In 'Toward a Drugs and Crime Research Agenda for the 21st Century', National Institute of Justice Special Report, Washington, DC, 2003.

Makkai, T., K. McGregor and Z. Wei, *Drug Use Monitoring in Australia: A Project Overview 2000*, 2009 [cited October 3 2009]. Available from https://www.afp.gov.au/__data/assets/pdf_file/3780/duma.pdf.

Mansfield, D., 'Alternative Development: The Modern: Thrust of Supply Side Policy, *United Nations Bulletin on Narcotics* LI (1-2):19-44, 1999.

Manski, C. F., J. V. Pepper and C. V. Petrie, *Informing America's Policy on Illegal Drugs: What We Don't Know Keeps Hurting Us*, Washington, DC: National Academy Press, 2001.

Markowitz, S, 'Alcohol, Drugs and Violent Crime', *International Review of Law and Economics* 25 (1):20-44, 2005.

Markowitz, Sara 'Alcohol, Drugs and Violent Crime', *International Review of Law and Economics*, 25(1): 20–44, 2005.

Massari, M., 'Ecstasy in the City: Synthetic Drug Markets in Europe: The Outcomes of a Field Research'; *Crime, Law & Social Change* 44 (1):1-15, 2005.

Massari, M., M. Mareso, P. Monzini and M. Veglio, 'The Synthetic Drug Market in Turin', in Gruppo Abele', in M. Massari (managing ed.) *Synthetic Drugs Trafficking in Three European Cities: Major Trends and Involvement of Organised Crime* (Turin: Gruppo Abele), 2003.

Mejía, D. and P. Restrepo, *The War on Illegal Drug Production and Trafficking: An Economic Evaluation of Plan*, Colombia: Universidad de los Andes Cede, 2008.

Ministerstvo spravedlnosti ČR, Trestní statistika státních zastupitelství a soudů za r. 2007: Přehled o stíhaných, podezřelých, obžalovaných a odsouzených osobách. Praha: Ministerstvo spravedlnosti ČR, 2008.

Moore, T. J., J. P. Caulkins, A. Ritter, P. Dietze, S. Monagle and J. Pruden, 'Monograph No. 9: Heroin Markets in Australia: Current Understanding and Future Possibilities', in *DPMP Monograph Series*. Fitzroy, Australia: Turning Point Alcohol and Drug Centre, 2005.

Mravčík, Viktor, Pavla Chomynová, Barbora Orlíková, Roman Pešek, Kateřina Škařupová, Eva Škrdlantová, Lenka Miovská, Hana Gajdošíková and Jiří Vopravil, Annual Report: The Czech Republic. 2007 Drug Situation, 2008. NMCDDA, Secretariat of the government council for drug policy coordination. Commissioned by the Government of the Czech Republic and the European Monitoring Centre for Drugs and Drug Addiction. Prague, September 2008.

Murphy, R. and S. Roe, Drug Misuse Declared: Findings from the 2006/07 British Crime Survey (Home Office Statistical Bulletin 18/07), London: Home Office, 2007. Available at http://www.homeoffice.gov.uk/rds/pdfs07/hosb1807.pdf (as of 17 September 2009).

Nadelmann, E. 1993. Cops across borders: the internationalization of U.S. criminal law enforcement. University Park, PA: The Pennsylvania State University Press.

Nadelmann, E., 'The DEA in Europe' in C. Fijnaut and G. T. Marx (eds.), *Undercover Police Surveillance In Comparative Perspective*, The Hague, The Netherlands: Kluwer Law

International, 1995.

Natarajan, M., 'Understanding the Structure of a Large Heroin Distribution Network: A Quantitative Analysis of Qualitative Data', *Journal of Quantitative Criminology* 22 (2):171-92, 2006.

National Advisory Committee on Drugs, & Drug and Alcohol Information and Research Unit, Drug Use in Ireland and Northern Ireland First Results from the 2006/2007 Drug Prevalence Survey Bulletin 1, 2008. Available at http://www.nacd.ie/publications/Survey_Final_25thJan.pdf (as of 17 September 2009).

National Drug Intelligence Center, *National drug threat assessment 2009*, Johnstown, PA: United States Department of Justice, 2008.

Newcomb, M. D., E. R. Galaif *et al.*, 'The Drug-crime Nexus in a Community Sample of Adults', *Psychology of Addictive Behaviors* 15(3): 185–93, 2001.

Newcomb, M.D., E.R. Galaif and J. Vargas-Carmona, 'The Drug-Crime Nexus among a Community Sample of Adults', *Psychology of Addictive Behaviors* 15 (3):185-93, 2001.

Nicosia, N. R. Liccardo Pacula, B. Kilmer, R. Lundberg, and J. Chiesa, *The Economic Cost of Methamphetamine Use in the United States, 2005*. Monograph, RAND: Santa Monica, 2009. Available at: http://www.rand.org/pubs/monographs/MG829/ (as of 17 September 2009).

Nye, J. S., 'Corruption and Political Development: A Cost-Benefit Analysis', *The American Political Science Review*, 61(2): 417–27, 1967.

OECD, *Fighting Corruption in Eastern Europe and Central Asia The Istabul Anti-Corruption Action Plan Progress and Challenges*, OECD Publishing, 2008.

OECD, *Fighting Corruption in Eastern Europe and Central Asia The Istanbul Anti-Corruption Action Plan Progress and Challenges*. France: OECD Publications, 2008.

Oulická, Z., Faktory ovlivňující tvorbu ceny na drogovém trhu v ČR . Praha: Vysoká škola ekonomická, Fakulta národohospodářská, 2008.

Ours, J.C. van, 'Dynamics in the Use of Drugs', *Health Economics* 15 (12):1283-1294, 2006.

Pacula, R. L. *et al.*, 'Marijuana Decriminalisation: What Does it Mean in the United States?', *Research Paper Series* No. 27, ImpactTeen, US, 2003.

Pacula, R. L., M. Grossman, F. J. Chaloupka, P. M. O'Malley and M. C. Farrelly, 'Marijuana and Youth' in J. Gruber (ed), *Risky Behavior Among Youths: An Economic Analysis*, Chicago: University of Chicago Press, 2001

Pacula, R. L., S. Hoorens, B. Kilmer, P. H. Reuter, J. R. Burgdorf and P. Hunt, *Issues in Estimating the Economic Cost of Drug Abuse in Consuming Nations: Report 3*, Cambridge, United Kingdom: RAND, 2009.

Paoli, L., V. Greenfield and P. Reuter, *The World Heroin Market: Can Supply be Reduced?* London: Oxford University Press, 2008.

Parker, H. and P. Kirby. *Methadone Maintenance and Crime Reduction in Merseyside*. In Crime Detection and Prevention Series Paper 72. London: Home Office Police Research Group, 1996.

Pearson, G. and D. Hobbs, *Middle Market Drug Distribution*, London: Home Office, 2001.

Pudney, S., C. Badillo, M. Bryan, J. Burton, G. Conti, and M. Iacovou, M., 'Estimating the size of the UK illicit drug market', 2006. In N. Singleton, R. Murray and L. Tinsley (eds.), *Measuring Different Aspects of Problem Drug Use: Methodological Developments,* 2nd edition (Home Office Online Report 16/06): Available at http://www.homeoffice.gov.uk/rds/pdfs06/rdsolr1606.pdf (as of 17 September 2009).

Reitox National Focal Point, National report to the EMCDDA: 'Spain' New development, trends and in-depth information on selected issues, 2007 (2006 data).

Reuter, P. and A. Stevens, An Analysis of UK Drug Policy Executive Summary. London: UK Drug Policy Commission, 2007. Available at http://www.ukdpc.org.uk/docs/UKDPC%20drug%20policy%20review%20exec%20summary.pdf (as of 17 September 2009).

Reuter, P. and J. P. Caulkins, 'Illegal Lemons: Price Dispersion in Cocaine and Heroin Markets', *Bulletin on Narcotics*, LVI (1–2), 141–65, 2004.

Reuter, P., *Seizure of Drugs* (2nd), 2001 [cited October 5, 2009. Available from http://www.enotes.com/drugs-alcohol-encyclopedia/seizures-drugs.

Reuter, P., *Transnational Crime: Drug Smuggling*, presented at Conference on Transnational Crime. University of Cambridge, 2000.

Reuter, Peter and Mark Kleiman, 'Risks and Prices: An Economic Analysis of Drug Enforcement', in Morris and Tonry (eds.), Crime and Justice: An Annual Review of Research Volume 7, 289–340, 1986.

Reuter, Peter H., Franz Trautmann, Rosalie Liccardo Pacula, Beau Kilmer, Andre Gageldonk, Daan van der Gouwe, *Assessing changes in global drugs problems, 1998–2007*. RAND Europe and Trimbos, TR-704-EC, 2009. Available at: http://www.rand.org/pubs/technical_reports/TR704/ (as of 17 September 2009).

Roberts, M. *et al., Law Enforcement and Supply Reduction*, The Beckley Foundation and DrugScope, 2004.

Roe, S., and J. Ashe, Young people and crime: findings from the 2006 Offending, Crime and Justice Survey (Home Office Statistical Bulletin 09/08). London: Home Office, 2008. Available at http://www.homeoffice.gov.uk/rds/pdfs08/hosb0908.pdf (as of 17 September 2009).

Saffer, H. , and F.J. Chaloupka, 'The Demand for Illicit Drugs', *Economic Inquiry* 37 (3):401-11, 1999.

Seddon, T., 'Drugs, Crime and Social Exclusion: Social Context and Social Theory in British Drugs-Crime Research', *British Journal of Criminology* 46 (4):680-703, 2006.

Seddon, T., 'Explaining the drug-crime link: Theoretical, policy and research issues', *Journal of Social Policy* 29: 95–107, 2000.

Serious Organised Crime Agency, Annual Report. London: Home Office, 2009a. Available at http://www.soca.gov.uk/assessPublications/downloads/SOCA_AR_2009.pdf. As of 17 September 2009.

Serious Organised Crime Agency, The UK Threat Assessment of Serious Organised Crime, London: Home Office, 2009b. Available at http://www.soca.gov.uk/assessPublications/downloads/UKTA2008-9NPM.pdf. As of 17 September 2009.

Silverman, L. P. and N. L. Spruill, 'Urban Crime and the Price of Heroin', *Journal of Health Economics* 4 (1):80-103, 1977.

Skogan, W., *Disorder and Decline: Crime and the Spiral Decay in American Neighbourhoods*, New York: Free Press, 1990.

Skogan, Wesley G., *Disorder and Decline: Crime and the Spiral Decay in American Neighborhoods*, New York: Free Press, 1990.

Smithson, M., M. McFadden, and S. Mwesigye, 'Impact of Federal Drug Law Enforcement on the Supply of Heroin in Australia', *Addiction* 100 (8):1110-2, 2005.

Smithson, M., M. McFadden, S. Mwesigye and T. Casey, 'The Impact of Illicit Drug Supply Reduction on Health and Social Outcomes: The Heroin Shortage in the Australian Capital Territory', *Addiction* 99 (3):340-8, 2004.

Stares, P. B., *Global Habit: The Drug Problem in a Borderless World*. Washington DC: Brookings Institution Press, 1996.

Svobodová, M., Dva lékárnici přišli o licenci kvůli drogám. Lidové noviny, August 11, 2008. Cited in Mravčík *et al.*, 2008.

Sznitman, S. R., B. Olsson and R. Room, *A Cannabis Reader: Global Issues and local experiences: Perspectives on Cannabis Controversies, Treatment and Regulation in Euro*, First ed. Lisbon: European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), 2008.

Taylor, B. and T. Bennett, *Comparing Drug Use Rates of Detained Arrestees in the United States and England*, Washington, DC: US National Institute of Justice, 1999.

Transparency International, Frequently Asked Questions about Transparency International [online], 2006. Available at: http://www.transparency.org/news_room/faq/faq_ti (as of 17 September 2009).

Transparency International, *Frequently Asked Questions about Transparency International,* 2006 [cited August 25, 2009. Available from http://www.transparency.org/news_room/faq/faq_ti.

Trávníčková, I. and P. Zeman, Možnosti trestní justice v protidrogové politice II. (empirická část). Praha: Institut pro kriminologii a sociální prevenci. 978-80-7338-059-5, 2008. Cited in Mravčík *et al.*, 2008.

U.S. Department of State, *2009 INCSR: Country Reports - Honduras through Mexico: Bureau of International Narcotics and Law Enforcement Affairs*, 2009

UN International Narcotics Control Board, Report, Vienna: International Narcotics Control Board, 2008.

United Nations Office on Drugs and Crime (UNODC), 2005 World Drug Report, Vienna, United Nations Office on Drugs and Crime, 2005.

United Nations Office on Drugs and Crime (UNODC), 2006 World Drug Report, Vienna, United Nations Office on Drugs and Crime, 2006.

United Nations Office on Drugs and Crime (UNODC), 2007 World Drug Report, Vienna, United Nations Office on Drugs and Crime, 2007b.

United Nations Office on Drugs and Crime (UNODC), 2008 World Drug Report, Vienna, United Nations Office on Drugs and Crime, 2008.

United Nations Office on Drugs and Crime (UNODC), 2009 World Drug Report, Vienna, United Nations Office on Drugs and Crime, 2009.

United Nations Office on Drugs and Crime (UNODC), Cocaine Trafficking in West Africa: The Threat to Stability and Development, Vienna: United Nations Office on Drugs and Crime, December 2007a.

United Nations Office on Drugs and Crime (UNODC), Crime and its Impact on the Balkans and affected countries. Vienna, United Nations Office on Drugs and Crime, 2008.

United Nations Office on Drugs and Crime *World Drug Report 2009*, Vienna: United Nations Office on Drugs and Crime, 2009

United Nations Office on Drugs and Crime, *2008 World Drug Report*, Vienna: United Nations Office on Drugs and Crime, 2008.

United Nations Office on Drugs and Crime, *World Drug Report 2005*, Vienna: United Nations Office on Drugs and Crime, 2005.

Ústav zdravotnických informací a statistiky ČR., General Population Survey of the Health Status and Lifestyle of the Population in the Czech Republic, 2006. Cited in Mravčík *et al.*, 2006.

Veen, H. T. van der, *The International Drug Complex: When the Visible Hand of Ccrime Fractures the Strong Arm of the Law. Understanding the Intertwined Dynamics of International Crime, Law enforcement and the Flourishing Drug Economy*, Amsterdam: Centre for Drug Research, Universiteit van Amsterdam, 2000.

Weatherburn D., C. Jones, K. Freeman and T. Makkai, 'Supply Control and Harm Reduction: Lessons from the Australian Heroin "drought"', *Addiction* 98(1): 83–91, 2003

White, H.R. 'The Drug Use-Delinquency Connection in Adolescence' in R. A. Weisheit (ed.) *Drugs, Crime and the Criminal Justice System*, Cincinnati, OH: Anderson Publishing, 1990.

White, Helene Raskin, 'The Drug Use-Delinquency Connection in Adolescence', *Drugs, Crime and the Criminal Justice System*, Ralph Weisheit, ed., Cincinnati, OH: Anderson Publishing, 1990.

Williams, J., R. L. Pacula, F. J. Chaloupka, and H. Wechsler, 'Alcohol and Marijuana Use among College Students: Economic Complements or Substitutes?', *Health Economics* 13 (9):825-43, 2004.

World Bank, *Diagnostic Surveys of Corruption in Romania: World Bank*. Romania: World Bank, 2001.

Yuan, Y. and J. Caulkins, 'The Effect of Variation in High-level Domestic Drug Enforcement on Variation in Drug Prices', *Socio-Economic Planning Sciences* 32 (4):265-76, 1998.

Zábranský, T., 2007 Methamphetamine in the Czech Republic. *Journal of Drug Issues* 37, 155–80, 2007.

Zarkin, G. A., S. C. Cates, and M. V. Bala, 'Estimating the willingness to Pay for Drug Abuse Treatment: A Pilot Study', *Journal of Substance Abuse Treatment* 18 (2):149-59, 2000.

APPENDICES

Appendix A. Creating price series without data: Harnessing the power of forensic data

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Abstract.

Data on (purity-adjusted) prices of illegal drugs are valuable for many purposes, particularly when high-frequency series are available (e.g. weekly or monthly, not just quarterly or annually). Over the last fifteen years, methods have been developed for creating price series using data from undercover purchases, such as those included in the U.S. Drug Enforcement Administration's STRIDE database. However, most countries around the world do not conduct enough undercover purchases for these methods to be practical. Some countries that do not make many undercover buys nevertheless seize illegal drugs frequently and quantitatively analyse the purity of the samples. This paper describes and validates a method to create high-frequency, purity-adjusted price series using just such forensic data on purity, plus occasional (e.g. annual) observations of the nominal price per raw gram.

1. Introduction

Illicit drugs are produced and distributed through markets. Traditionally, illicit drug markets and problems have been monitored with measures related to use, such as past-year prevalence or the number of emergency room mentions. Over the last fifteen years increasing attention has been paid to monitoring drug prices (Caulkins and Reuter, 1998; Caulkins, 2007). (Here and throughout, unless otherwise noted, by 'price' we mean 'purity-adjusted price'.)[86]

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[86] For drugs such as cocaine, heroin, and methamphetamine sold in developed countries, the cost of diluents and adulterants is essentially negligible relative to the cost of the pure drug itself. Diluents are simple cutting agents such as mannitol; adulterants are cutting agents such as caffeine that are themselves psycho-pharmacologically active.

The three most common sources of drug market prices are: expert reports (most often from enforcement agencies),[87] user self-reports,[88] and transaction-level data on undercover purchases. The former have a variety of limitations, including insensitivity to price fluctuations and rarely being reported more often than quarterly, and usually only annually. Since shorter-term price fluctuations do occur, higher-frequency series are more valuable.

A significant limitation of user reports is their inability to describe purity accurately. Since changes in purity-adjusted prices often manifest through changes in purity, this greatly undermines the ability to monitor purity-adjusted prices.

While transaction-level data from undercover purchases are, for many purposes, the measure with the fewest drawbacks, weaknesses are still present. For one, quite a few data points are needed when working with transaction-level data in order to compensate for the considerable variability found in drug prices, even after controlling for time, location, and transaction size (Reuter and Caulkins, 2004). Also, with certain exceptions such as the Domestic Monitoring Program (DMP), the sampling is driven by enforcement priorities, rather than any formal sampling plan (Horowitz, 2001; Manski *et al.*, 2001). A considerable literature uses price series based on undercover purchases recorded in the U.S. Drug Enforcement Administration's System to Retrieve Information from Drug Evidence (STRIDE) database (Frank, 1987; Caulkins, 1994). For example, STRIDE is used by many of the demand elasticity studies reviewed by Grossman (2005).

These methods have somewhat limited applicability outside the U.S. as most countries do not conduct as many undercover purchases as does the U.S. This paper proposes a method of creating high-frequency price series for countries that conduct forensic analysis of drug seizures without undercover purchases. The method would not be applicable to countries that have no transaction-level data at all. The method is also not relevant to drugs that are not diluted or adulterated even when supplies are tight: marijuana, some diverted pharmaceutical pills, or, perhaps, methamphetamine sold only in its crystallised form (known as ice).

The method we propose combines low-frequency observations of the standardised nominal price (e.g. from user surveys) with high-frequency data from forensic analysis of drug seizures to create a high-frequency purity-adjusted price series.

We show that this method yields purity-adjusted price trends for heroin, cocaine, crack, and methamphetamine that are consistent with those produced by standard methods,

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[87] Examples in the U.S. include the National Narcotics Intelligence Coordinating Committee (NNICC) and some of the Regional Information Sharing System Members (RISS; http://www.iir.com/riss/). International examples include the United Nations Office on Drugs and Crime (UNODC, 2004) and the Australian Crime Commission's Illicit Drug Data Report (Australian Crime Commission, 2005).

[88] Examples include the U.S. Arrestee Drug Abuse Monitoring (ADAM) program, the U.S. National Survey on Drug Use and Health (NSDUH) questions about marijuana markets (e.g. Caulkins and Pacula, 2006), the Australian Illicit Drug Reporting System's interviews of injecting drug users (Fry and Miller, 2002), and even unofficial sources such as the "High Times" magazine's index of cannabis prices (e.g. Jacobson, 2004), and the U.K. Independent Drug Monitoring Unit Price surveys.

match series produced with a new "gold standard" approach that is relevant in certain special cases, and correlate with exogenous events and data trends.

The method takes advantage of the useful data from seizures whose purity is analysed quantitatively in forensic laboratories based on the fact that the pure quantity in a bag adjusts more quickly than the nominal transaction value. Data can be used without the associated price data because the nominal price of a retail transaction is often stable and/or standardised.

Even when the street purchase is defined by quantity (e.g. an "eight-ball" weighs 1/8 of an ounce), the nominal prices are often quite stable over time. For example, by definition, "dime bags" of heroin sell for $10 (dime = 10). As Kleiman (1992) notes, for many common illegal drugs the effective retail price is adjusted by changing the purity and sometimes the quantity of drugs acquired in a transaction, rather than by changing the dollar value of the transaction. This practice makes sense for illicit transactions. Negotiating prices and making changes extend the duration of the transaction, increasing the odds of detection by the police.

It is worth noting that the proposed method can also be useful in countries that do conduct undercover purchases if they have more seizure than purchase observations. For example, of the 214,785 observations in the subset of STRIDE we obtained for this analysis, just 43,438 (20%) were purchase observations. So this approach essentially quintuples the density of data exploited relative to standard methods.

The new method has limitations. Notably, if (1) the exogenous information about nominal prices is not weight-based (e.g. knowing that a "cap" of heroin costs $40 AUD but not how much a cap weighs), (2) it is hard to determine from forensic data what weights to associate with a particular nominal price, and (3) prices adjust at least in part by changing the weight of a bag, not just purity, then that component of price variation will be missed. The method shares some weaknesses common to conventional price estimation methods that use undercover purchases. The distribution of seizures, like undercover purchases, reflects non-random sampling based on enforcement priorities, so variation in market enforcement targets over time might create misleading trends. There may be consistent differences between what is seized and typical market qualities (e.g. the data will underestimate market purity if "dumb" dealers both sell lower purities and are more likely to have their drugs seized). However, the method does avoid some limitations of working with undercover purchases. In particular, some have worried that field agents may not have strong enough incentives to negotiate price, and so may pay above-market rates. Also, buy-busts primarily sample the price charged to first- or second-time customers, excluding long-term customers who might get some sort of "loyalty discount".

The next section provides background information on drug price monitoring. The third section describes the proposed method and discusses practical issues with its implementation. The fourth section applies the method to a variety of drugs and cities and compares the resulting series to various foils, offering circumstantial evidence supporting the reasonableness of the method. The final section concludes.

2. Some background on drug price monitoring

One complication when developing time series on drug prices is the lack of transaction standards with respect to size (quantity in grams) or purity. Contrast this with retail purchases of milk. Most milk comes in one of a modest number of quality categories (e.g. organic whole vs. non-organic skimmed). Milk is usually retailed in just a few common volumes (one litre, two litre, etc.), and retail transactions usually offer no quantity discount (same price per litre no matter how many litre sized containers are bought). For illegal drugs, by contrast, transactions cover a near continuum of purities and transaction scales.

It turns out that a log-linear model can provide an excellent adjustment for quantity discounts (Caulkins and Padman, 1993; Clements, 2006). Over a broad range of market levels, price is proportional to transaction size (i.e., weight) raised to an exponent less than 1.0, typically in the vicinity of 0.8. This relationship was observed in U.S. data by Caulkins and Padman (1993) and has been seen subsequently elsewhere, e.g. Australia (Clements, 2006) and the U.K. (Caulkins, Gurga, and Little, 2009). Theoretical justification of this functional form was provided by Crane, Rivolo and Comfort (1997) in terms of fractal geometry and by Caulkins (1997) in behavioural terms, with dealers finding the distribution network branching factor that strikes the optimal balance between profits and enforcement risk.

Adjustment for purity is complicated by the fact that customers rarely know the actual purity of what they are buying. Even the sellers have imperfect knowledge at best; sellers know whether they themselves cut the drugs with diluents or adulterants but do not have precise knowledge of the purity of what they bought. In this sense, illegal drugs are not only what economists call an "experience good" (one whose quality is not revealed to the buyer until after purchase) but something of a "double-sided experience good" whose quality is not fully understood by either buyer or seller until after the transaction is complete (Reuter and Caulkins, 2004).

Typical market price is not estimated by dividing the transaction price by the pure quantity of drugs in that bag, but instead by dividing the amount paid per gram after standardising with quantity discounts, by the purity that would be expected of transactions of that size, in that time and place (Caulkins, 1994, 2007).

Hence, the standard approach to estimating price series uses a two-stage regression approach. First, it estimates the expected purity for each transaction and then it regresses log price paid on log transaction size to adjust for quantity discounts (Arkes *et al.*, 2004). A variant is to standardize individual transactions' prices for quantity discounts and expected purity and to then report the results using descriptive statistical methods relevant for any time series, such as plotting rolling medians over time or examining entire distributions (cf., Caulkins, 1994; Crane, Rivolo and Comfort., 1997; Fries *et al.*, 2008). This approach is sensible, but it is somewhat obscure to people unfamiliar with regression analysis.

A simpler and more readily understandable alternative is to ask how the pure quantity obtained for a fixed purchase cost has changed over time. If the number of pure grams obtained in $20 purchase doubles from one year to the next, then the price per pure gram at that market level—defined in terms of monetary value not weight—has fallen by 50%. This approach, which we call the "gold standard," is practical when many observations

come from purchases of one or a few specific dollar values, as is typical of retail enforcement by local police.

For most cities, STRIDE contains data only from federal investigations, which rarely target the retail level. In most places STRIDE purchases are predominantly for more than $100, and there is no single dollar value that accounts for more than a modest proportion of all purchases. Hence, the gold standard approach would throw out most of the data, and using regression to adjust for quantity discounts and expected purity becomes worth the extra effort. However, the gold standard approach with STRIDE data is practical for Washington DC because STRIDE includes all samples analysed in DEA laboratories, and drug samples obtained by the Washington DC Metropolitan Police are sent to DEA laboratories for analysis. For crack, a substantial plurality of those purchase observations is for exactly $20 or $40.

3. More detailed description of methods and example series

One of the principal advantages of the method proposed here is that it is so simple. There are just four steps:

1. Create a high-frequency purity series from a relevant set of transaction-level observations for which purity is measured quantitatively.

2. Obtain a low-frequency (e.g. annual) series on the price per gram, not adjusted for purity.

3. Smooth or interpolate the low-frequency series to fill in the missing values corresponding to time instants for which high-frequency data are available.

4. Divide the interpolated price per gram, not adjusted for purity, by the purity for corresponding time periods.

Some sophistication is possible when creating the high-frequency purity series. If purity varies in similar ways over time across multiple cities, then one might use regression to pool data across locations. Indeed, Arkes *et al.* (2004) did this in their implementation of the first step of the Expected Purity Hypothesis (EPH) approach. However, to remain open to the possibility of city-specific not just nation-wide purity troughs, we maintain our analysis at the city level.[89]

Regression might also be useful if the data contain covariates that were predictive of purity. We have seen forensic data that recorded potentially predictive covariates ranging from time of day to physical characteristics of the location (e.g. in an apartment vs. in a commercial establishment such as a restaurant vs. in a public park). STRIDE does not

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[89] The extent of spatial variation in purity within a metropolitan area is a largely unexplored topic in the literature. We were able to examine this for one city—Melbourne, Australia—and found essentially no evidence of differences in purity across police districts within that area. But there is a lore that such differences exist in New York City. Presumably analysts would be well advised to look for such differences in case they exist.

include such variables, and to the best of our knowledge the predictive power of these variables has not been studied in the past, but they might be an interesting avenue for further research, and regression analysis has the capacity to include such variables.

Below we take the much simpler approach of calculating the central tendency (mean or median) of all observations whose weight falls within the market level for which a price series is being created (typically retail).[90] In some markets there is systematic variation in purity across market levels. The danger of mixing wholesale and retail purity observations is that if the composition of wholesale to retail observations changed from one time period to the next, then that could create spurious variation in average purity. Except for meth, the STRIDE seizure data were so abundant for the drugs and locations analysed that we could use fairly narrow weight ranges to obviate purity variation. Of course we only attempted to produce series with a granularity that matched that of our comparison data (which were available no more frequently than quarterly). There may be rewards to a more sophisticated approach to pooling observations from across a broader range of transaction sizes if one wishes to push frequency limits.[91]

In step 2 we intentionally say to "obtain" rather than "create" low-frequency (e.g. annual) series on price not adjusted for purity because many countries already collect and report this data. If such data are not already available, or if they are reported for geographic areas that do not correspond to the catchment area for the forensic data, then low-frequency price data could be generated. User-surveys such as the Australian IDRS system, surveys of arrestees such as ADAM, surveys of users in treatment, or interviews with law enforcement key informants can generate unadjusted price data. None of these sources are flawless, but we are trying to improve on the status quo (which often consists of nothing but these low-frequency reports) without imagining that the resulting series will be perfect.

Smoothing the low-frequency series on price in step 3 eliminates stair step jumps between December 31st of one year and January 1st of the following year. Without smoothing the final series would show sudden price jumps or drops at the end of each year. The most sensible method of smoothing data to interpolate to the higher frequency will depend on the context. Moore *et al.* (2005) used annual price data from a specific point within the calendar year. They used the survey price for that month and linearly interpolated the price between that time and the time of the next survey. Here we do not actually use survey data so it does not come from one specific month; we simulate such results using the STRIDE purchase data from the entire year. We make the purity in the first and in the last quarter of each year a weighted average of the price in that year and the adjacent year, with weights selected to create linear trends in price rather than discrete jumps. (Note: We do not use the STRIDE purchase price information in any way other than creating this low-frequency series on price per raw gram, so this is not "cheating" with respect to the idea that we are illustrating how one could create high-frequency series with forensic data.)

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[90] One referee argued that the mode is also worth investigating.

[91] In principle the same issue could arise with other types of market segmentation besides quantity-based market level. For example, if indoor transactions consistently had a higher or lower purity than outdoor transactions, one might want to create different purity series for indoor and outdoor transactions.

A final comment is STRIDE specific. Those who use STRIDE know that it is infamous for having suspicious outliers. For example, the New York City data included 151 observations with purity greater than 100% (Most but not all of these measured units in millilitres not grams, suggesting that there is a coding issue, but others were standard observations measured in grams.). Others look like clear typos, such as paying $1 for 1,989 grams of cocaine; most likely the 1989 belongs in the date field. Others look like misplaced decimals. Consider two cocaine observations from less than a month apart in New York City. In the first $315 was paid for 11.4 grams; in the second, the data state that $29,500 was paid for 9.74 grams. Given prevailing prices, it is much more likely that $295.00 was paid for the 9.74 grams, but the decimal point was lost, turning the $295.00 into $29,500. The existence of such outliers is not surprising. Nor is it a critique of the DEA. STRIDE is an administrative data set, used for tracking the inventory of drug evidence. An outlier that could greatly distort academic policy analysis is rarely of any consequence to the administrative functions that STRIDE serves on a daily basis. However, when creating price series it is necessary to make some effort to delete these outliers.

Among STRIDE analysts a contentious issue is what to do with zero purity observations. One side argues that they are rip-offs in which the buyer truly received none of the drug they expected. The other side argues that they, or most of them, are actually missing observations. We subscribe to the latter camp. We have talked to forensic scientists in the U.S. and in other countries who say that observations are missed. The patterns in the data also suggest this. Zero purity observations are much more common among very small observations (which might be too small to analyse or to be worth analyzing) or when the sheer number of observations is very large (suggesting the laboratories may have run short on analytical capacity and had to prioritise their cases). This debate brews unresolved among STRIDE analysts, but the issue is somewhat moot inasmuch as the methods proposed here are designed for people who do not have access to STRIDE. If we have made the "wrong" judgment on this matter, it should only make it all the harder for us to reproduce the patterns seen in the comparison series.

4. Comparisons supporting the validity of the new price series

In this section we use the method just described to create high-frequency purity-adjusted price series for methamphetamine in San Diego County, powder cocaine in New York City, and both crack and heroin in Washington, DC. In each case we compare the resulting series to the official price series generated by Fries *et al.* (2008) using the Expected Purity Hypothesis.

For each series we also offer one additional analysis to help corroborate the results. For the methamphetamine series, we observe its correlation with trends in treatment admissions. We compare the crack and heroin series to gold or near-gold ("silver") standard series based on observations of a particular dollar value. For the New York City powder cocaine, we focus on the high-frequency purity series themselves instead of the high-frequency purity-adjusted prices. To understand what part of local purity variation might be driven by variation in import purity we compare purity series across market levels to identify where cutting occurs and across the largest seizures to corresponding data from Miami International Airport.

4.1 Purity-adjusted series for methamphetamine

We start with methamphetamine. It has been the subject of more time-series analyses in the U.S. than have been cocaine and heroin (Cunningham and Liu 2003, 2005, 2008; Cunningham, Liu and Muramoto, 2008; Dobkin and Nicosia, 2009) and because of a quirk in the geographic distribution of STRIDE's methamphetamine observations. No single city has a large proportion of STRIDE's heroin, cocaine, or crack observations, but a considerable proportion of STRIDE's methamphetamine observations came from San Diego County, including both San Diego and its immediate neighbours (10,934) and the Escondido area (5,505). Only two other cities—Honolulu and Philadelphia—had substantial numbers of methamphetamine observations.

This quirk matters because the published high-frequency price series using the EPH method are for the country as a whole; the city-specific series (e.g. those in Arkes *et al.,* 2004) are annual. We construct a quarterly series for San Diego County and compare it to Fries *et al.*'s (2008) *national* quarterly purity-adjusted EPH price series, produced using STRIDE for the Office of National Drug Control Policy (ONDCP). Comparing a city-specific with a national series is not ideal, but the disjunction is least acute for methamphetamine because that one city accounts for so many of the observations.

Of the 16,439 San Diego area observations in our data set, we used 9,723 purchase and seizure observations of d-methamphetamine with positive weight denominated in grams and whose purity was not listed as being over 100%.[92] To create the annual price series, we used 1,664 of those observations that had a price between $10 - $1,000 and whose residual when regressing log price on log weight was not greater than two, in absolute value. To eliminate observations with a slipped decimal point, that cut-off point eliminates observations whose cost was 7.4 times larger, or 1/7.4 times as large, as the norm for that weight. We created the high-frequency purity series with the 7,962 of the 9,723 observations that had positive purity. (See Table A1.)

We followed the methodology described in Section 3 except that instead of using averages, we used medians, which for methamphetamine data seemed to be less volatile. Figure A1 displays the high-frequency (quarterly) median purity, the low-frequency (annual) price per raw gram, and the smoothed or interpolated price per raw gram.

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[92] Methamphetamine exists in two stereo-isomers; d- and l- isomers. Only d- interacts with neuro-receptors in the brain, although both have physiological effects, e.g. on the adrenal system. There is uncertainty about how to deal with this in price monitoring, e.g. whether the l-methamphetamine should be considered to be an adulterant or whether it belongs in the numerator when computing purity. Furthermore, some forensic labs have changed their reporting procedures over time, as more modern methamphetamine synthesis methods typically produce only d- rather than a racemic mixture. Here we use only the d- observations because Fries *et al. (*2008) did so in creating their price series.

Table A1: Selecting the subset of methamphetamine observations used in analysis

Sub setting Step 1	Observations		
	remaining	lost (N)	lost(%)
Beginning Number (N)	**16439**	**0**	**0**
Keep only Purchase and Seizure	11101	5338	32.47%
Remove Zero Amount	11003	98	0.60%
Remove Purity>100	10913	90	0.55%
Remove non GMS obs	10421	492	2.99%
Remove all non d-Meth obs	9723	698	4.25%
Ending Number of Observations	**9723**	**6716**	**40.85%**
Sub setting Step 2A-For Price Series			
Remove <$10	2537	7186	43.71%
Remove >$1000	1690	847	5.15%
Remove>2 Residual	1664	26	0.16%
Ending Number of observations	**1664**		
Sub setting Step 2B-For Purity Series			
Remove Zero Purity	7962	1761	10.71%
Ending Number of observations	**3732**		

Figure A1: Quarterly median purity, annual price per raw gram, and smoothed price per raw gram of methamphetamine in San Diego County
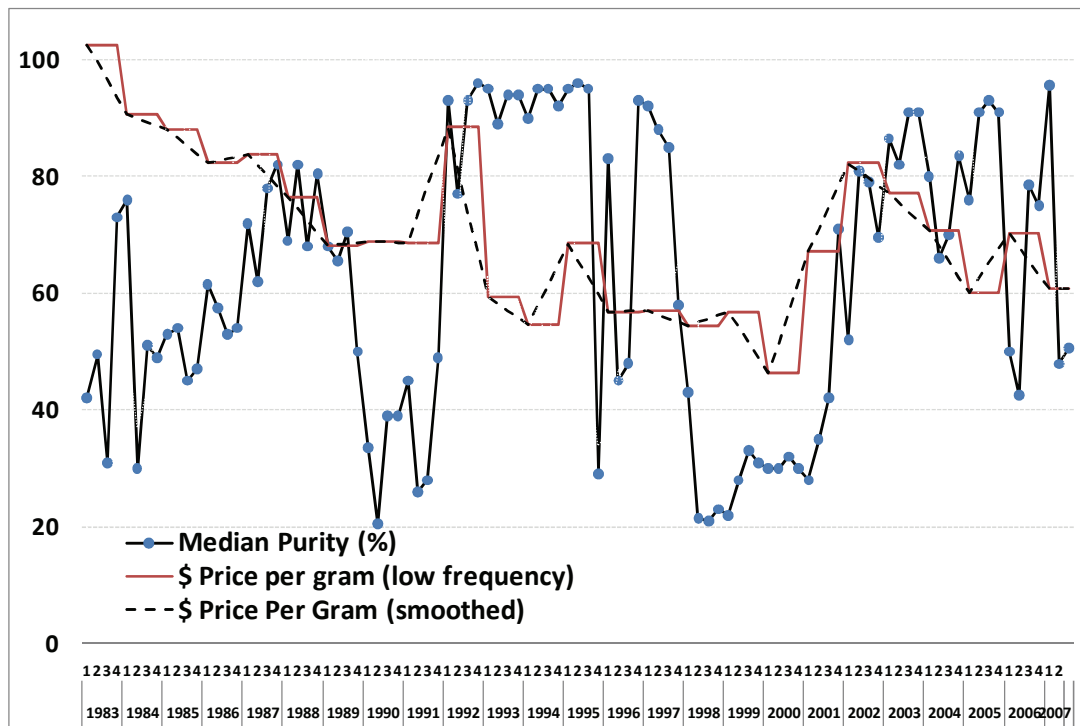
Dividing the smoothed price per gram by the median purity yields the high-frequency (quarterly) price per pure gram for San Diego County. Figure A2 plots this series alongside the national quarterly price per pure gram estimated by Fries *et al.* (2008) after adjusting for inflation).

Overall, the two series clearly correlate (correlation coefficient 0.71) despite reflecting different geographic areas. Both series show clear price spikes of more or less the same duration and shape from 1990-1991, 1995-1996, 1998-1999, and 2006. Both series also identify price declines through early 1984 and from 1999 through 2005.

Figure A2: Purity-adjusted price per pure gram estimated for San Diego with new method largely parallels the national series Fries *et al.* (2008) produced using the EPH method.
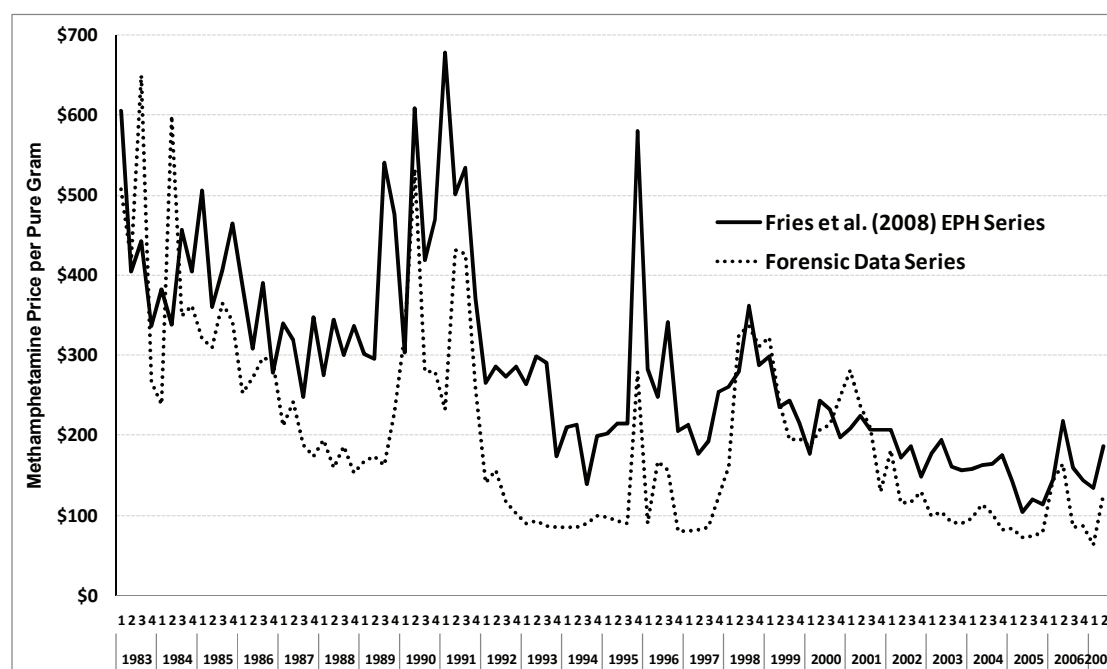
However, the series differ in three respects. First, our series is more jagged in the first two years, and those spikes and dips are not likely to be due merely to sampling error. The very first spike comes in a quarter (1983, Q3) when there were only 11 purity observations, but the trough in late 1984 and second spike (1984, Q2) come from fluctuations in purity based on 37-50 observations. Second, the Fries *et al.* (2008) series has a spike in 1989, Q3, that does not appear in our series. Arkes *et al.'s* (2004) San Diego specific annual series also reports no change from 1988 to 1989 suggesting that San Diego's market differed from the rest of the nation in that year. Third, our series shows a spike through late 2000-early 2001 that does not show up in the Fries *et al.* (2008) series or the Arkes *et al.'s* (2004) series, although the Arkes' *et al.,* annual series would have a hard time showing a spike that was split between two years.

Some debate whether any price series generated with STRIDE should be used for economic analysis (Manski *et al.*, 2001). One argument in favour of using such series is that they correlate with many independent drug-related indicators, including emergency department mentions, medical examiner mentions, surveys of the household population and high-school seniors, and urinalysis results for arrestees and the general workforce

(Hyatt and Rhodes, 1995; Crane, Rivolo and Comfort, 1997; Saffer and Chaloupka, 1999; Caulkins, 2001; DeSimone, 2001; DeSimone and Farrelly, 2003). As a similar validation exercise, we sought to correlate our series with methamphetamine treatment admissions data for California, specifically the Substance Abuse and Mental Health Archive (SAMHA) Treatment Episode Data Set (TEDS) Series. The publicly available data are only available on an annual basis, but they are available from 1993 to 2007.[93] SAMHSA also gave us permission to use monthly counts for 2000 to 2007, which we aggregated into a quarterly series. Those monthly counts were created via a special run to support another RAND project.

For the annual series, we investigated whether years with above average prices had below trend numbers of treatment admissions instead of whether their price and treatment levels correlated. The correlation between San Diego price and California methamphetamine treatment *levels* was low (−0.23) because in the 1990s there was a general upward trend in treatment admissions while prices exhibited marked year to year variations. This upward trend may be attributable to a combination of expanded treatment supply (from Proposition 36, Byrne Grants, and block grants) and increased demand as the methamphetamine epidemic progressed. Hence, we instead estimated the trend in treatment admissions three ways: (1) linear with time, (2) quadratic with time, and (3) as a power function of time. There was difference between current price and the average price over the period (scaled) alongside the treatment admissions residuals with both a linear and power function trend (Fig. 3).[94] Departures from the long-run average price negatively correlated with departures from the long-run trend in treatment admissions (−0.53 and −0.68 with the two treatment residual series, respectively). When price was below its long-run average, treatment admissions were above trend. Conversely, when prices were above average, treatment admissions were below trend.

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[93]Available online from SAMHDA at http://www.icpsr.umich.edu/cocoon/SAMHDA/DAS3/00056.xml.

[94] The quadratic treatment trend was nearly indistinguishable from the linear trend. Results are nearly identical if price difference is measured relative to a linear trend rather than the simple averaged price.

Figure A3: Deviations from average San Diego methamphetamine price correlate negatively with deviations from trend in California methamphetamine treatment admissions.
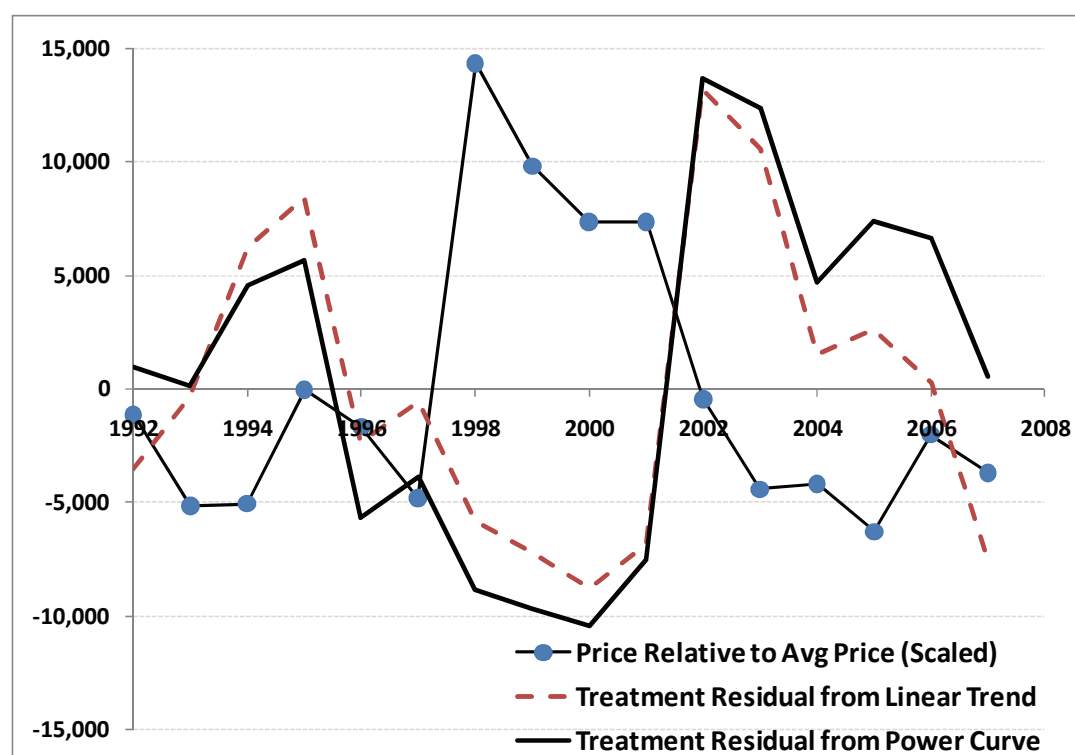
We conducted a similar exercise for the quarterly series for the 2000–2007. Over that period treatment admissions continued to grow (more gradually) while prices trended downward, so there was a negative correlation in the simple series (-0.82). Departures from the price trend also correlated negatively with departures from the trend in treatment admissions regardless of whether the treatment trend was modelled as linear (-0.61) or with a power function (-0.49).

In summary, the price series created using the new method correlates positively with the price series created with the current standard method. Furthermore, its peaks and troughs correlate (negatively, as expected) with deviations from the overall trend in an external indicator, namely treatment admissions.

4.2 Variation in New York City powder cocaine purity across market levels

Most variation in purity-adjusted price series comes from variation in purity, so it is reasonable to ask; where does variation in purity come from? How much is due to local dilution between the upper and lower market levels in a single city, and how much to variation at the import level, which is shared by all cities within some broader market?

Within STRIDE, the best data for investigating these questions are for powder cocaine from the New York City metropolitan area.[95] Washington, DC has more observations in

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[95] For the New York metro area we combined STRIDE observations with the following city labels: Bronx, Brooklyn, Manhattan, Queens, Staten Island, New York, Jamaica (in New York State), Newark, Newark International Airport, and JFK International Airport.

total, but no other city has as many observations from both the higher and lower market levels.

We created a purity-adjusted price series for cocaine powder in New York City. Figure A4 shows that the annual version (solid line with round plotting points) falls within Arkes *et al.'s* (2004) lower- to upper-bound range (dashed lines) of estimates for cocaine powder in New York. To the extent that there is a difference with Arkes *et al.'s* point estimates (solid line), it occurs in the late 1990s and is due to increasing prices per raw gram in our analysis.

Figure A4: Forensic data based series for the price per pure gram of cocaine powder in New York City is consistent with Arkes *et al.'s* (2004) EPH series.
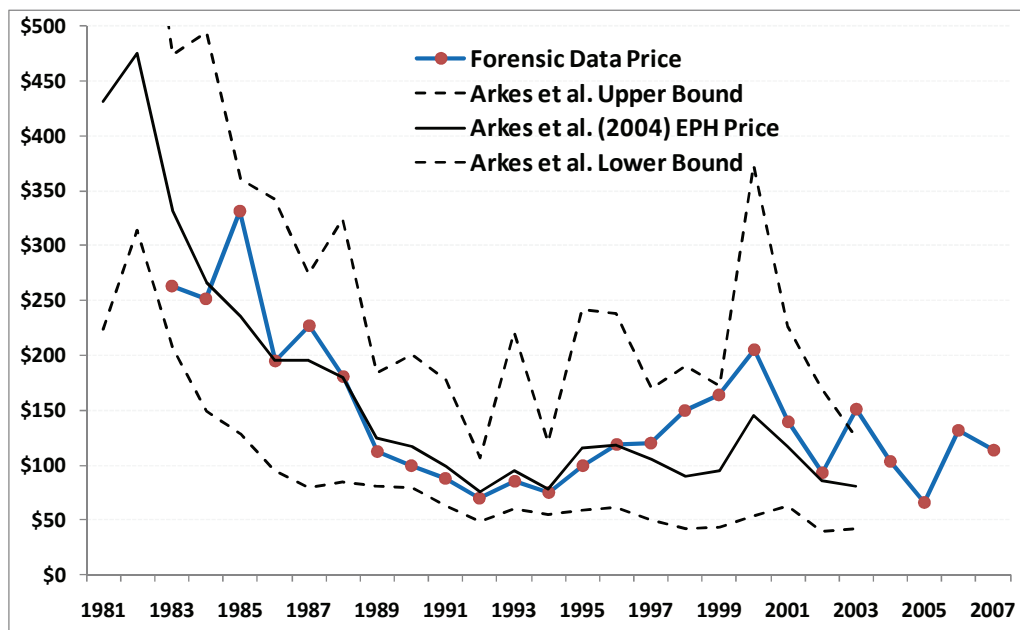
Our primary interest here, however, is the relationship of purity across market levels. We divided the data into five weight ranges with roughly equal numbers of observations, except when defining one category as specifically transactions of about one kilogram.[96] Table A2 shows the weight cut-offs and corresponding numbers of observations.

Table A2: New York City powder cocaine market levels across which purity is compared

Weight range	0.1 – 6.9 grams	6.9 – 105 grams	105 – 820 grams	820 – 1,100 grams	> 1,100 grams
# of Observations	2,897	2,911	2,925	2,177	3,710
Interpretation	Less than ¼ ounce	¼ oz to 0.1 kilogram	0.1–1 kilogram	1 kilogram	Greater than 1 kilogram

Plotting average purity over time by market level shows that purity tends to be lower at lower market levels, but this difference is not constant over time. At the higher market levels, purity varies primarily via long-term trends without the abrupt plunges found at lower market levels. That is what one would expect if, from time to time, supplies within

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[96] We retained cocaine hydrochloride purchase and seizures observations with positive weight denominates in grams and purity not exceeding 100%.

the city become tight, and dealers cut the cocaine more aggressively than usual to "stretch it" somewhere between the multi-kilogram and the street levels. Figure A5 shows these trends for the highest and two lowest market levels on a simple semi-annual basis (Quarterly plots and/or plots showing all five lines become cluttered.) The 1989-1990 cocaine market shock described by Crane, Rivolo and Comfort (1997) is a good example. Multi-kilogram level purity appeared to have dropped somewhat (from 85% to 80% pure), but average purity below 100 grams fell more (from >75% to <60% pure).

Figure A5: Average semi-annual New York City powder cocaine purity at three different weight ranges (market levels)
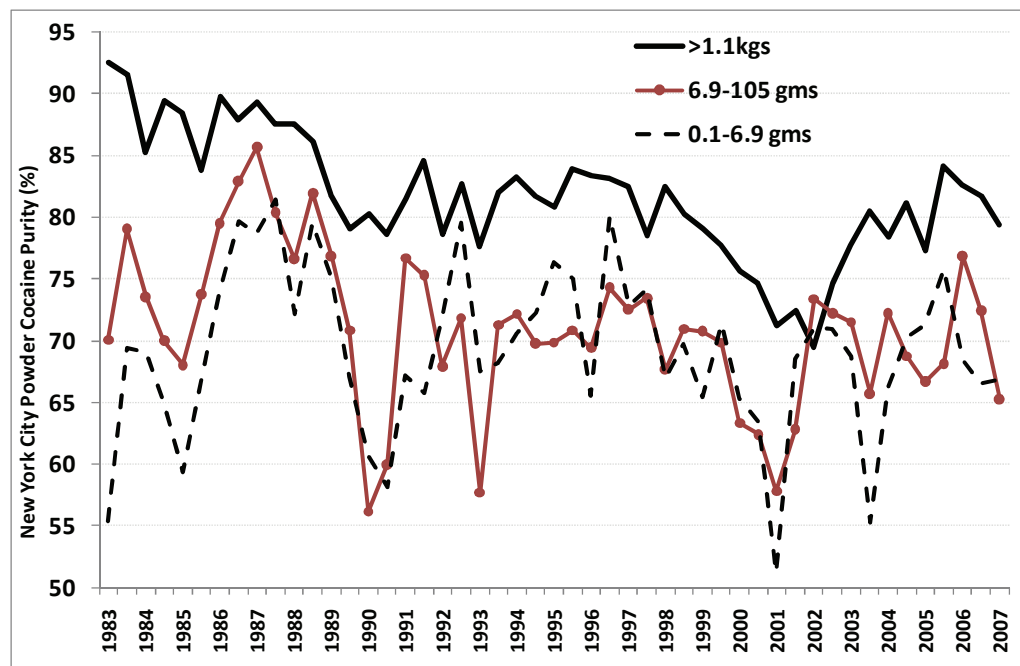
The purity series for the two lower market levels share many of the same features. That underscores an unsurprising but nonetheless important point. The coincidence in sharp purity drops produced from independent data suggests that the drops are not merely due to sampling error. One can also prove this by applying a simple test for the difference in means between the observations from two adjacent time periods.

Correlations over time are strong between adjacent market levels, but weak (<0.25) between the lowest and highest market levels (Table A3.). This leads to a second obvious but important conclusion if one believes that most cocaine reaches New York City in shipments of a kilogram or more. Much of the volatility in retail purity is due to cutting within New York City, not in purity at the high-level market level of wholesale.

A corollary is that the price estimation method suggested here is less appropriate for monitoring prices at higher-market levels for markets such as the New York City cocaine market where there is considerable cutting.

Table A3: Correlation over time between pairs of five semi-annual purity series for different market levels of cocaine in New York City

	0.1 – 6.9 g	6.9 – 105 g	105 – 820 g	820 – 1100 g	> 1.1 kg
0.1 – 6.9 gms	1.0				
6.9 – 105 gms	0.646	1.0			
105 – 820 gms	0.306	0.633	1.0		
820 – 1100 gms	0.125	0.549	0.703	1.0	
> 1.1 kg	0.235	0.582	0.711	0.728	1.0

Given these preliminary trends, we turn next to two more interesting questions: (1) What proportion of the time is purity at lower market levels in a trough, indicative of a "stressed" market and (2) Are the trends in high-level purity shared across multiple cities, suggesting their origins are at the national or import level?

Figure A6 plots the semi-annual, average powder cocaine purity of observations of 0.1–105 grams for the New York City metropolitan area from 1983–2007. The dotted lines give the corresponding 95% confidence interval for the mean.

Figure A6: Average powder cocaine purity in New York City at lower market levels (<105 grams; dotted lines denote 95% confidence interval)
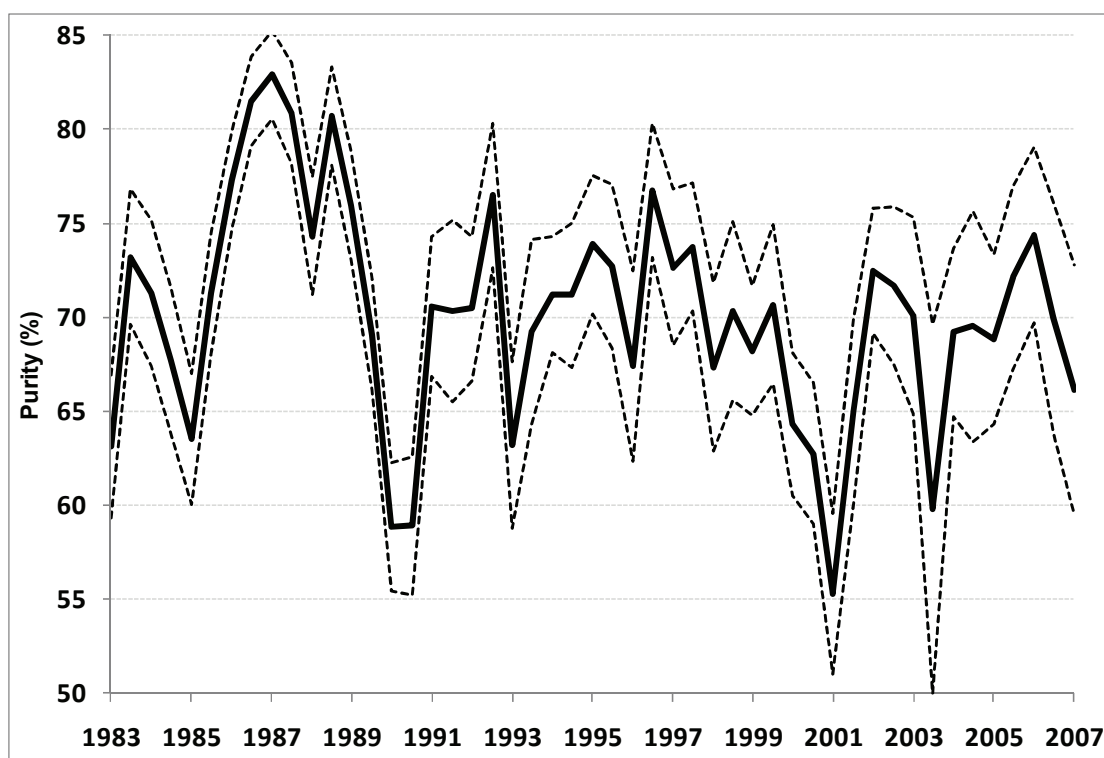
One-tailed t-tests suggest the average purity in one half-year was lower than in the preceding year suggested at seven points seen as troughs within this time interval, plus an

eighth at the end.[97] Similar tests comparing a given period to the six-month period one year earlier (i.e., two periods earlier) finds two more drops to be significant, but also identify the two drops in 2000 and 2001 as part of a single, extended trough. Table A4 summarises the characteristics of these troughs.[98]

Five of the nine troughs lasted only a single six-month period. Two others (1985 and 2007) had below-baseline purity for two six-month periods, but there was some ambiguity as to whether they were better described as six- or twelve-month troughs. Two (1989-1990 and 2000-2001) had purity levels below baseline for four consecutive 6-month periods.

Table A4: Troughs in New York City cocaine powder purity, 1983-2007

Time of onset	Average purity before trough	at nadir	p-value of purity at onset vs.		Duration
			1 period earlier	2 periods earlier	
1985 I	67.7*	63.6	0.0584	0.0018	6–12 mos.
1988 I	80.9	74.3	0.0008	0.0000	6 mos.
1989 I	80.7	58.8	0.0072	0.0000	24 mos.
1993 I	76.5	63.2	0.0000	0.0074	6 mos.
1996 I	72.7	67.4	0.0570	0.0195	6 mos.
1998 I	73.7	67.4	0.0119	0.0417	6 mos.
2000 I	70.7	55.3	0.0132	0.0027	24 mos.
2003 II	70.1	59.8	0.0304	0.0122	6 mos.
2007 I	70.0	43.6**		0.0206	6-12 mos.?
2007 II	*66.2*	*43.6**￼*	*0.0008*		*6-12 mos.?*

* Purity in 1984 I was 71.3. Looking back one period suggests a 6-month disruption beginning in the first half of 1985. Looking back two periods suggests a 12-month disruption starting in the second half of 1984.
**The 43.6 is based on only 4 observations. Because the 2007 trough comes at the end of the times series when there are fewer data points, it is hard to interpret.

Looking over 50 half-year periods, chance alone might be expected to generate a couple of apparent troughs, but not nine. If all nine represented market disruptions, then the New York City cocaine market was stressed in 16 of the 50 semi-annual periods, or about one-third of the time. If we dismiss two of the one-period troughs as attributable to chance variation, that would still leave the market stressed in 14 of 50 periods, which is still more than one-quarter of the time.

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[97] Arguably, the very first period might also represent a trough since it is so far below the following period, but without more knowledge of purity before 1983 we prefer not to count it as a trough.

[98] To assuage worries that these declines might be artifacts of changes in the distribution of observation sizes within the range examined, we also estimated purity at the one gram level by regressing log purity on log amount for each half-year. Comparing the resultant intercepts with the preceding period's intercepts at the 95% confidence level identified the same nine troughs, with the sole exception that the regression approach suggested that the final trough began one period earlier.

This is a surprising and provocative finding. New York City is the largest city in the U.S. and as such is often presumed to have the largest and most robust of drug markets. Conventional wisdom, perhaps informed by price reports which do not adjust for purity variation, holds that such markets are very stable, and able to shrug off law enforcement's attempts to disrupt them. However, Figure A6 suggests that the New York City cocaine market may have been stressed a substantial proportion of the time.

In addition to sharp troughs in purity at lower market levels, there seems to have been a long-term secular decline in average purity of multi-kilo cocaine observations from the late 1980s through 2003 (Figure A5.). One way to investigate that story is to examine purity series from other import markets. Most cities do not have as many large cocaine seizures as New York, but at the smaller scale, Miami International Airport does. Only 41 of its 4,022 observations are of retail size less than 6.9 grams, and only another 10% are between 6.9–265 grams. There is little evidence of difference in purity across any of these weight ranges among the Miami airport observations, so we combined the 3,556 observations of more than 265 grams to create one, semi-annual average purity series to compare with the series from the highest market level in New York City (>1,100 grams) (Figure A7.).

The graph is consistent with a story of tight supplies (and/or limitations on production technology) that affected purity all the way back to the import markets in the late 1990s and early 2000s. In this case we are not looking for a correlation among short-term peaks and troughs, but rather a concordance among long run trends. The series were highly correlated (correlation coefficient 0.82). Both start above 90% purity and show a slight downward trend through 1988 to around 87%. Both drop abruptly in 1989 and then remain more or less level at 80% +/− 4% until late 1998 or 1999, when they decline again through 2002 before rebounding in 2003.

Figure A7: Trends in average cocaine powder purity of large observations in New York City (> 1.1 kg) and Miami International Airport (> 265 grams)
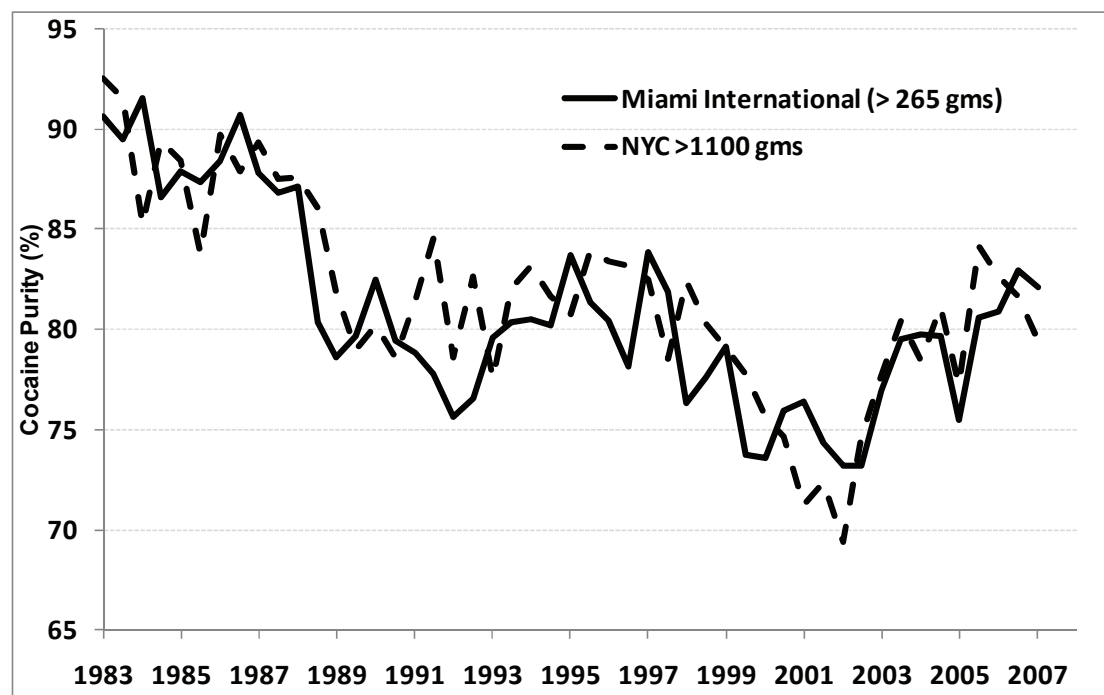
To summarise: (1) The troughs in New York City retail purity series do not seem random; they correlate sensibly with purity at other market levels, (2) Over a 25 year period there were at least six and perhaps as many as eight discrete periods of six or more months during which retail cocaine purity in New York City was depressed because of increased cutting within New York City, and, hence, (3) If increased cutting is a sign of constrained supply, it is plausible that for roughly one-quarter of this 25-year period the New York City cocaine market was experiencing some sort of stress. That guesstimate of one-quarter gets raised to one-third or more if one believes that the overall U.S. national market was experiencing constrained conditions at the import level in the late 1990s and early 2000s.

It is important to note that annual price monitoring would have overlooked the majority of these six to eight periods of reduced purity. Indeed, annual monitoring would have difficulty recognising that the markets ever experienced periods of reduced purity. Imagine a hypothetical situation in which market stress led to reduced purity for six months every other year. In an annual series, that would create fluctuations up and down in the mean purity from year to year, but there would be no way to ascertain what was the baseline purity level. The series would merely look noisy, without allowing one to recognise that there were discrete periods with depressed purity.

4.4 Illustration of "Gold Standard" price series for crack in Washington, DC

Washington, DC is unusual within STRIDE for having very large numbers of retail purchase observations because the DEA forensic laboratories analyse samples obtained by the local Washington, DC Metropolitan Police. Substantial proportions of these buys are for certain common round dollar amounts (Table A5.).

Table A5: Number of crack buys of specific dollar values in STRIDE data for the Washington, DC metropolitan area, highlighting instances of > 50 Observations

Year	$20-buys	$40-buys	$50-buys
1985			3
1986	3	2	13
1987	48	21	54
1988	395	183	45
1989	560	263	102
1990	592	237	94
1991	918	170	76
1992	424	137	36
1993	244	73	14
1994	69	22	7
1995	96	17	15
1996	63	10	10
1997	71	18	15
1998	181	19	11
1999	241	38	20
2000	172	8	20
2001	207	30	15
2002	145	10	2
2003	107	7	3
2004	127	10	9
2005	140	26	23
2006	162	51	11
2007	23	3	3
Total	4988	1355	601

The shaded portions suggest that we can create a "gold standard" price series covering 1988–2006 using $20 purchases as a benchmark against which we can compare a crack price series based on forensic data, which we use in the next subsection.

First though, we tested the reasonableness of this gold standard approach by taking advantage of the period from 1989–1991 when there were large numbers of observations for three different purchase sizes: $20, $40, and $50. We created monthly gold standard series using each of these purchase values separately and then compared the series to see if they agreed.

As noted, STRIDE contains suspicious outliers, and more sensible results can be obtained by deleting them. Outliers were defined as those with (1) zero pure quantity, (2) purity <10%, (3) observations with weights over 2 grams, or (4) weights more than five standard deviations above the average weight for that year.

We dropped those with purity above 100% and fifteen observations with purity less than 10%. Crack cannot be made with low purity cocaine, so purities in the single digits likely represent slipped decimal points. The largest of those deleted points had a purity of 6.7%, whereas the next lowest purity was 15% and included, so there was a considerable hole in the distribution of purities below which we dropped observations.

For similar reasons we dropped sixteen observations whose weight was over 10 grams, including one of 676 grams. By comparison, the mean weight for the remaining $20, $40,

and $50 observations is just 0.22 grams with a standard deviation of 0.15 grams. We then repeatedly dropped observations whose weight was more than five standard deviations above the mean for that year and purchase amount (in dollars). This led to another fifteen observations being dropped, all with weights over one gram.

We then computed the average pure weight for each purchase size in each month. Dividing the purchase value (in dollars) by the average pure weight yielded an estimate of the price per pure gram. For example, for the fifty-six $20 buys made in January, 1989, the average pure weight obtained was 0.197 grams of cocaine, suggesting an average price of $20 / 0.197 = $101 per pure gram.

Figure A8 plots the three resulting series for all points with at least four purchases of that size in that month. The $20 purchase series was the least volatile because it was based on the most observations. The main message is that all three gold standard series are consistent with each other, with the $40 and $50 series generally falling within the confidence interval for the $20 series. Pair-wise t-tests among the three series for all 36 months yielded 36*3= 108 comparisons, of which only 8 produced differences that were statistically significant at the 0.05 level, as compared to the 108 * 0.05 = 5.4 one would expect based on chance alone.

Figure A8: Monthly gold standard crack price series for Washington DC using buys of $20 (bold line; dashed lines give 95% confidence interval), $40, and $50
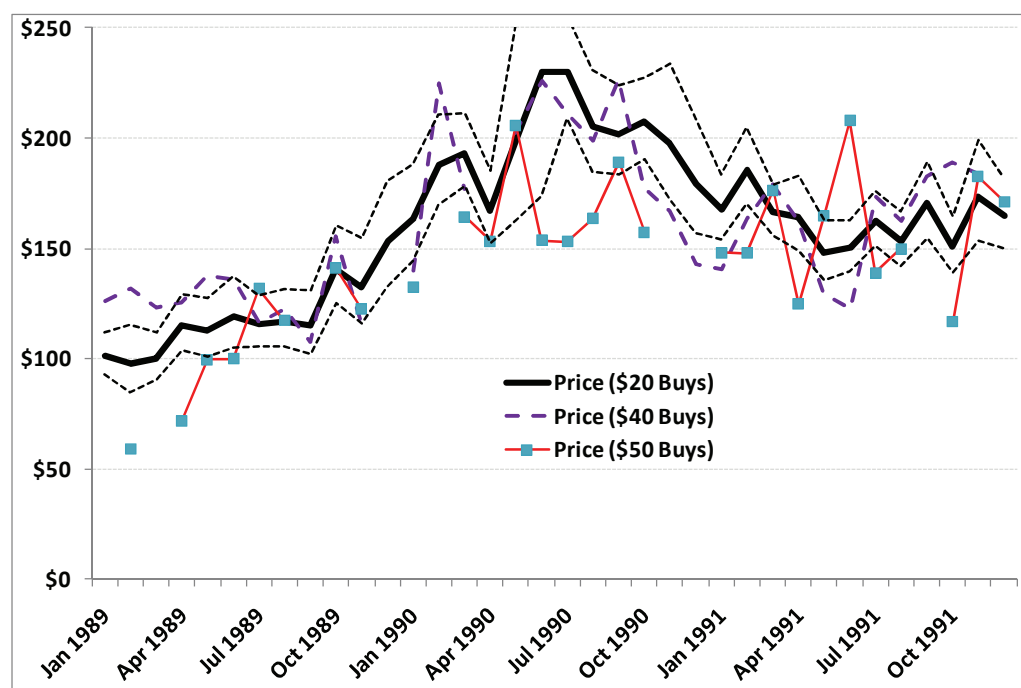
The three series all correlated, with correlation values ranging from 0.54 (between the $40 and $50 buy series) to 0.72 (between the $20 and $40 series). The correlation comes from general trends, not month-to-month peaks and troughs. All three series found that purity-adjusted crack prices in Washington, DC increased by 60–80% between September of 1989 and early 1990, before falling back to stabilise by early 1991 at levels roughly 40% above baseline. This is consistent with the belief that during this period the combined

efforts of the Bush Administration's War on Drugs and the initiatives of the Colombian government constrained cocaine supply in the U.S. (Crane, Rivolo and Comfort, 1997).

We turn next to the question of whether price series created with primarily forensic data could reproduce the peaks and troughs observed in such "gold standard" price series.

4.5 Comparing Gold Standard and forensic-based series for crack in Washington DC

We created a longer, quarterly "Gold Standard" Price series based on $20 crack purchases in Washington DC. Data cleaning was as before, dropping the following observations: (1) zero pure quantity, (2) purity <10%, (3) observations with weights over 2 grams, (4) eighteen additional observations whose weight was more than five standard deviations above the average weight for that year (done iteratively).

Figure A9 plots the resulting price series, along with its associated 95% confidence interval. The 4,903 purchase observations used to create the price series were not spread uniformly over time. Many quarters between 1988 and 1992 had over 100 $20-purchases. One quarter (1997 Q4) had only three. As a result, the width of the confidence interval varies considerably over time.

The curious plunge in crack prices in 1996 Q4 happens because five of the 22 observations in that period were larger (>0.3 grams) than is typical, though still outside our definition of an outlier.

Figure A9: Quarterly gold standard series of crack prices per pure gram in Washington DC using buys of $20
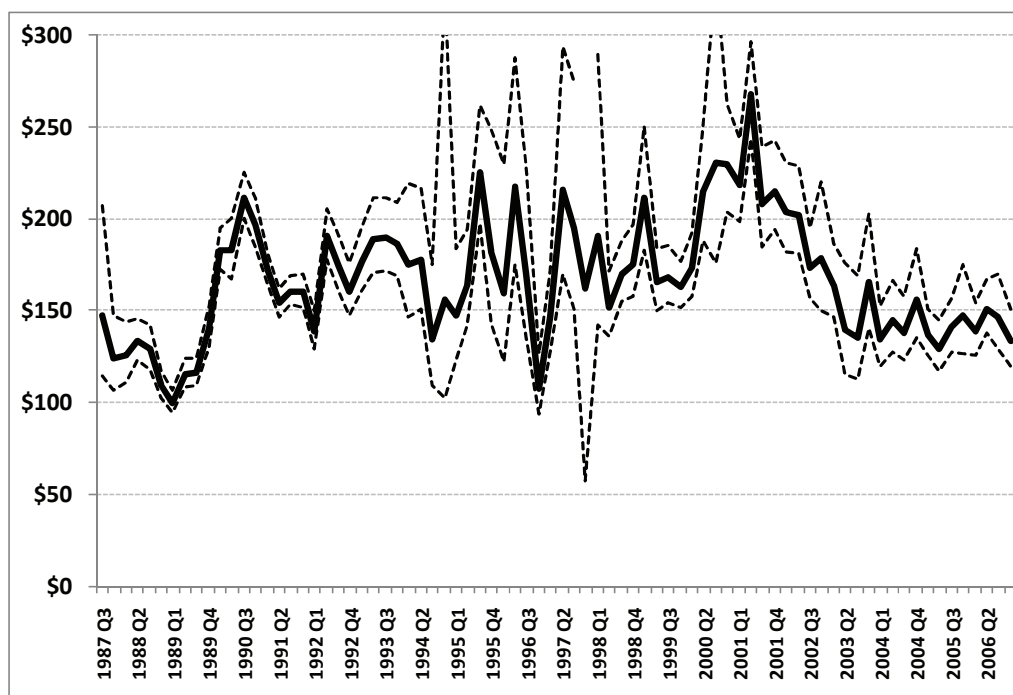
The "forensic data only" series was created following the steps in Section 3. Figure A10 plots the low-frequency series for the price of one gram of crack, not adjusted for purity. It was obtained by regressing the log of cost on log of weight for purchases between $10 and $1,000 each year after dropping as outliers: (1) 8 observations with weight of 0 grams, (2) 5 observations with a weight of 0.001 grams, and (3) observations whose residuals when

regressing log cost on log weight were greater than 2.0 in absolute value. Figure A10 plots the resulting low-frequency series for price per raw gram.

Scatter plots of log cost on log weight indicated a slightly convex relationship, particularly in the early years, so we compared results with and without a quadratic term. We used results from the quadratic regression. For 15 of the 22 years the coefficient on the quadratic term was statistically significant at the α = 0.05 level. In three others, the adjusted R^2 was higher with the additional term, and in the remaining four the difference in the adjusted R^2 was 0.000 to three significant digits. The significance of the quadratic term is somewhat surprising, inasmuch as it is believed instead that a log-linear relationship with a constant exponent extends over many market layers (Crane, Rivolo and Comfort, 1997). For present purposes we are only interested in getting the best point estimate. While the differences were not enormous, there may be merit in subsequent investigations of the price-quantity relation with respect to the degree of precision afforded by the unique density of observations for Washington DC.

Figure A10: Annual price per gram, not adjusted for purity, of crack in Washington DC (dashed lines indicate 95% confidence interval)
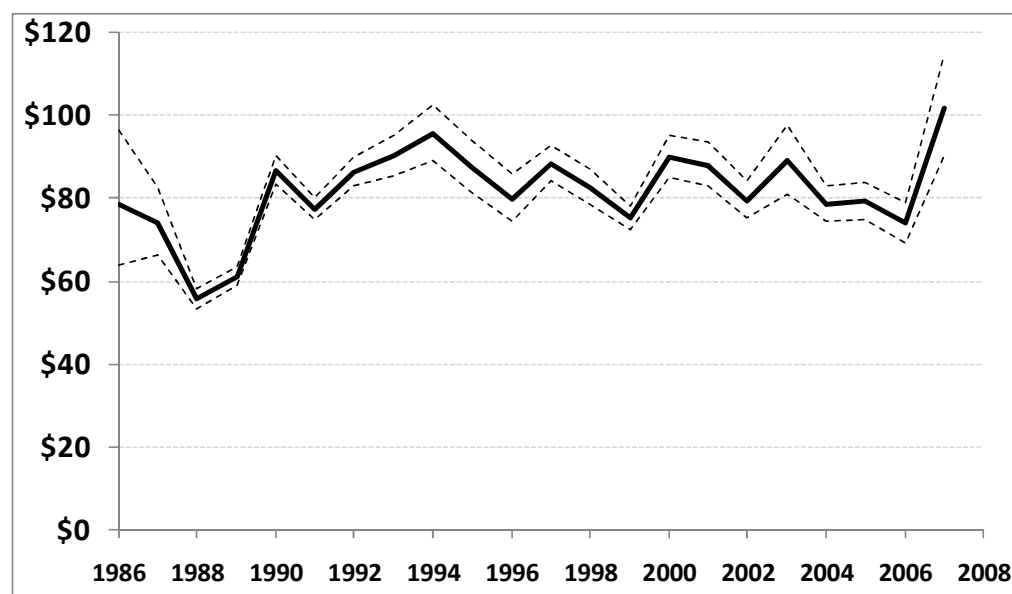
Figure A11 shows the high-frequency (quarterly) purity series which was estimated as the average purity of all crack observations of less than 4 grams with purity of at least 10%. Figure A11 shows the results. Note that the series was quite precise, except at the very beginning and end of the time period when there were fewer observations. Excluding the first and last two quarters, there was an average of 560 observations per quarter.

Several of the troughs and trends in the Washington DC crack purity series are familiar from the New York City powder cocaine purity series. Notably, the data share dips in 1988, 1993, and 2007 and two longer troughs between 1989–1990 and 2000–2001, as well as a prolonged decline in purity from 1993 to 2001. There is also a sharp dip in late 1995, shortly before a similar New York City drop in early 1996 and closer to the time Crane, Rivolo and Comfort (1997) associate with interdiction of the Peruvian air bridge.

There are several additional short, sharp troughs (1987 Q1, 1992 Q2, and 1997 Q2) that are not visible in the semi-annual New York City series.

Dividing the smoothed prices per raw gram from Figure A10 by the purities in Figure A11 generates the quarterly purity-adjusted price series (Figure A12.). Figure A12 shows that this series, created (almost) only with forensic data, mimics trends in the gold standard series. The gold standard series gives the price per pure gram when buying $20 worth at a time. Because of quantity discounts (Caulkins and Padman, 1993) this, naturally, is higher than the price per pure gram when buying in quantities of one raw gram, which is what we estimate with our new approach. So Figure A12 shows not only the original gold standard series (dashed line), but also that same series scaled to have roughly the same average level as the series created with forensic data (solid line with diamonds) by multiplying it by two-thirds (solid line).

Figure A11: Quarterly average purity of crack in Washington DC (dashed lines indicate 95% confidence interval)

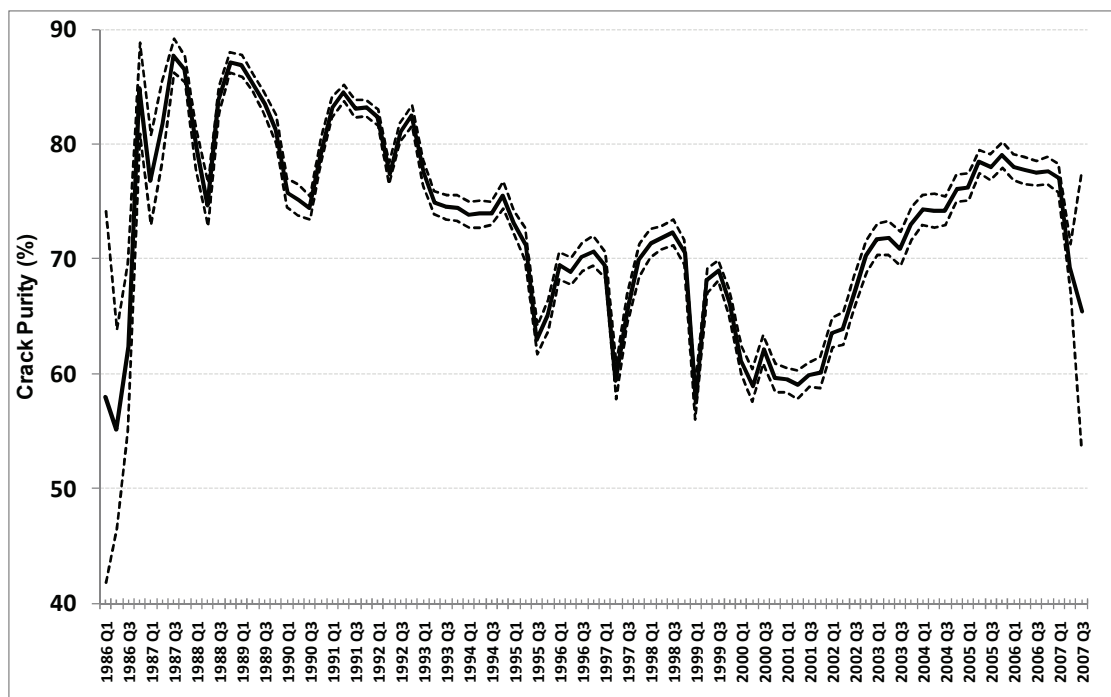**Figure A12: Crack price per pure gram derived from forensic data parallels the gold standard series based on $20 purchases in Washington DC.**
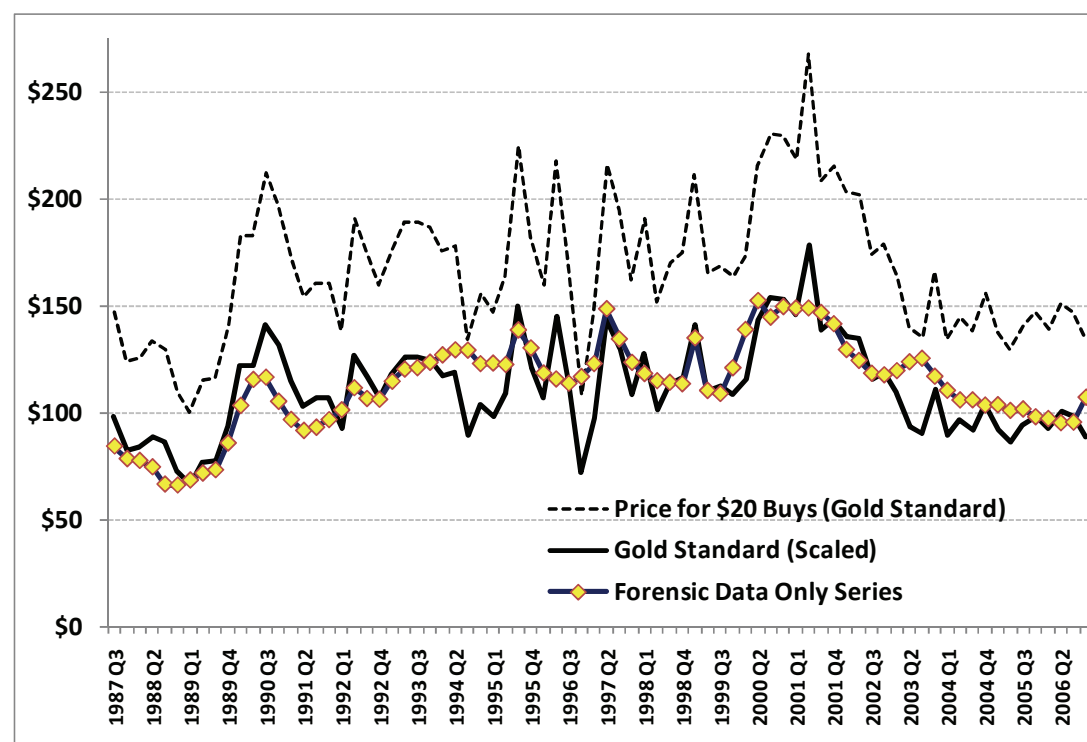
The series are highly correlated (correlation of 0.763) and share similar general trends. There was an initial decline interrupted by the 1989–1991 market disruption. There was a subsequent price increase through 1993, and then a slow modest decline through 1999, interrupted by significant spikes in 1995–1996 and 1997. The gradual decline was replaced by a substantial and sustained increase in purity-adjusted prices beginning in early 2000 and extending at least through mid-2002. The correspondence of four of the price spikes (1995 Q3, 1997 Q2, 1999 Q1, and 1999 Q4–2002 Q2) is truly dramatic. The correspondence of the 1989 Q4–1991 Q1 and the 1992 Q2 spikes is also clear, although the lines do not completely coincide.

There are five quarters in which the price series differed by more than $30 per pure gram (1994 Q3, 1996 Q2 and Q4, 2002 Q2 and Q3). All are quarters for which there were relatively few $20 purchases underpinning the gold standard series (18 on average, vs. an average of 65 in the other periods).

The more puzzling discrepancy was that the forensic series was consistently 10-20% below the gold standard series for eight consecutive quarters, from 1990 Q3–1992 Q2. Mechanically that is primarily because the 1991 annual price per gram not adjusted for purity was over 10% lower in 1991 than in adjacent years. However, that cannot be blamed on sample size, as 1991 was the single year with the most $10–$1,000 purchases that could be used in the regression.

Overall, however, the high-frequency series created using forensic data on purity coupled with low-frequency information on price per raw gram reproduced the general trends and the spikes and troughs of the gold standard price series.

4.6 Comparing Gold Standard and forensic-based series for heroin in Washington DC

We conducted a similar comparison between forensic-based and gold standard series for heroin in Washington DC. This effort was more challenging and less conclusive because, although Washington, DC has more retail heroin purchases than most cities, there are still far fewer heroin observations than crack observations. The heroin purchases are also less clustered on certain specific dollar values. As a result, the gold standard heroin series is based on fewer observations than was the gold standard crack series and, hence, is noisier.

As with crack, data are most plentiful between 1988 and 1992. For crack that was fortuitous because those were interesting years, with marked variation in price. Unfortunately, for heroin prices it is a period of stability. We did create purity-adjusted price series with forensic data and using the gold standard method with both purchases of $20 and $40. All three series were entirely consistent with each other; but that consistency is not strong evidence inasmuch as the series were all fairly flat. (No figure shown).

A longer term gold standard series for heroin was not possible because there were not enough purchase observations of any one dollar value for most years. We sought instead to create a longer term series using what might be called a "silver standard," pooling all buys with dollar values between $20 and $40. That is, we divided the total amount spent in a time period on heroin buys of $20–$40 by the total pure weight of heroin obtained in those buys to estimate the price per pure gram for that time period for purchases in the $20–$40 range.

We call this a silver standard, not gold, because it could be vulnerable to changes in the composition of buys within that range. If in one quarter all buys were for $40, and in the next quarter all were for $20, then quantity discounts when buying $40 worth instead of $20 worth might make the series appear to jump when in reality that increase was a spurious consequence of changes in the mix of purchase sizes.

Nevertheless, the exercise may still be of some interest for two reasons; First, the extent of quantity discounts when moving from $20 to $40 purchases may not be substantial. Second, while the frequency distribution of buys of different amounts did vary from quarter to quarter, the variation was never extreme. Furthermore, inasmuch as this weakness contaminates our silver standard series with spurious noise, it would only be that much harder for our forensic data based series to match that standard. Since we do see similarity, that is still evidence in favour of the forensic-based data series.

For the low frequency price series not adjusted for purity, we regressed log cost on log amount for purchases of $10–$1,500 (Figure A13.). Data cleaning was similar to the previous sections. We retained heroin hydrochloride purchase and seizure observations with positive weight and purity and deleted observations whose residual absolute value in the regression was greater than 2.0... The resultant 2,248 observations were not spread consistently over the time period observed. For instance, there were 325 in 1985 but only 15, 9, 6 and 9 per year from 1994 through 1997. Those four years with scarce data were omitted from the analyses.

Figure A13: Annual heroin price per gram, not adjusted for purity, in Washington DC (dashed lines indicate 95% confidence interval)
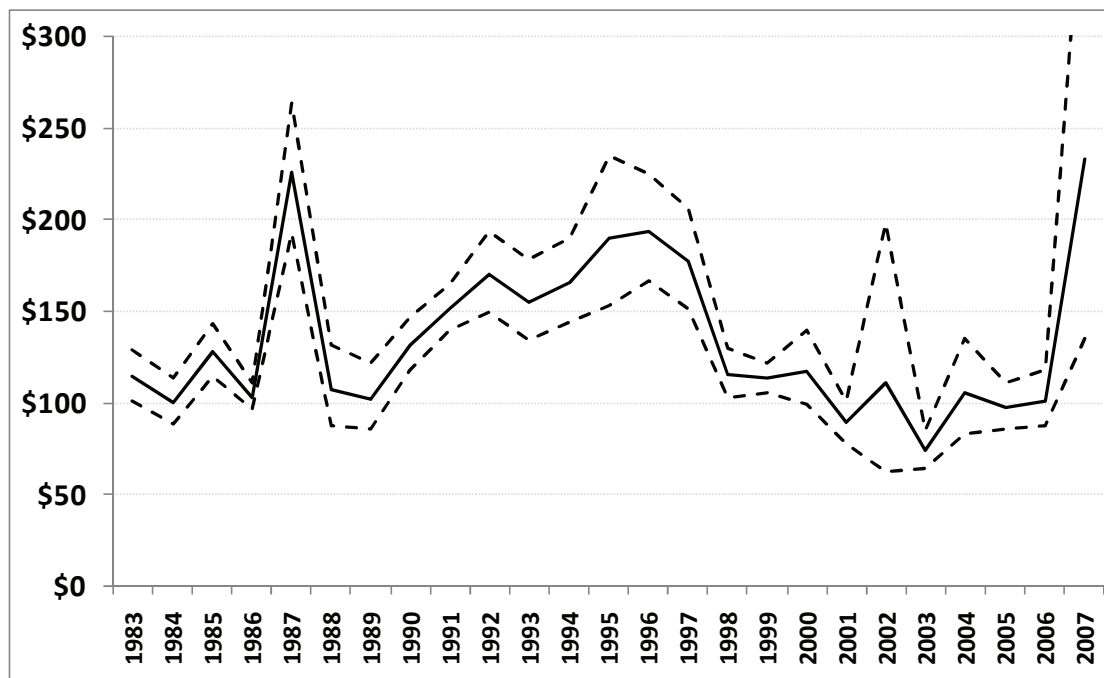
The high-frequency average purity series was estimated as the average purity of all heroin observations between 0.1–1.0 grams in that quarter. Plotting purity vs. either transaction size or amount revealed a positive slope indicating higher purity at larger weights, but with no clear cut-offs to distinguish weights below which there was no further dilution. Absent a clear cut-off, we picked the 0.1–1 gram range as the cut off point to be consistent with Fries *et al.'s* (2008) series produced for ONDCP, which divides the data across three weight categories: 0.1 to 1 gram, 1 to 10 grams, and greater than 10 grams. This range also seems to strike a reasonable balance between the twin goals of maximising sample size and minimising the extent to which observations are pooled across different market levels that may be subject to different degrees of dilution. In particular, we were able to retain 11,192 observations after dropping the 3,080 observations with weight less than 0.1 grams and the 5,543 observations weighing more than 1 gram.

Figure A14: Quarterly average purity of heroin in Washington DC (dashed lines indicate 95% confidence interval)
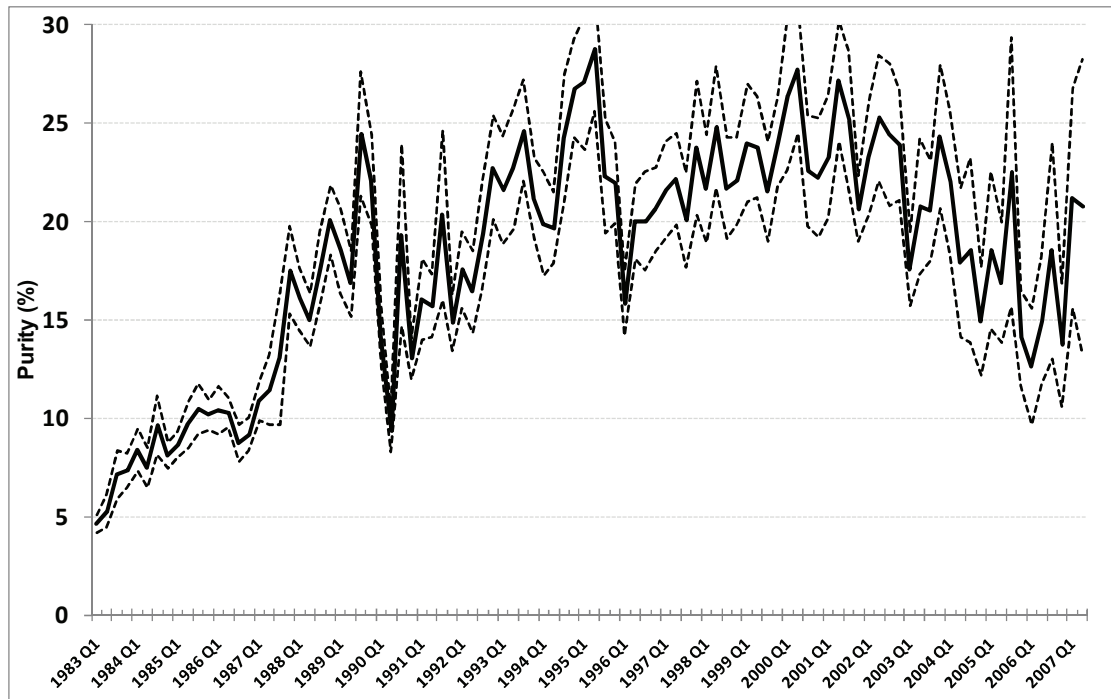
Dividing the smoothed price per raw gram series by purity generates a quarterly purity-adjusted price series. Figure A15 compares it to the silver standard series for quarters in which there were at least ten observations that contributed to the silver standard estimates.

The two series are highly correlated (correlation coefficient of 0.82), and there is some correspondence in spikes. Specifically, the 1990, 1992, and 2004 spikes in both graphs share the same shape and height. However, the 1986 spike is much more pronounced in the forensic data series. Three spikes that appear only in the silver standard series (2000 Q4, 2005 Q2, 2006 Q2) all happen in quarters when the silver standard was based on relatively few data points (11, 14, and 6 respectively). Still, the correspondence in the more recent years is not overwhelming.

Figure A16 compares the forensic based series, adjusted for inflation, with Fries *et al.'s* (2008) official heroin price series for the country as a whole (also inflation adjusted). Again, the correlations are reasonably high, specifically 0.86 with the Fries *et al.*'s (2008) EPH series and 0.83 with a second series Fries *et al.* produced with a different methods, called the median series. However, there is not much of a correspondence in peaks and troughs, perhaps because the forensic data series is based on just one city, whereas the other two series are based on data from the country as a whole.

Figure A15: Heroin price per pure gram derived from forensic data parallels the silver standard series based on $20-$40 purchases in Washington DC
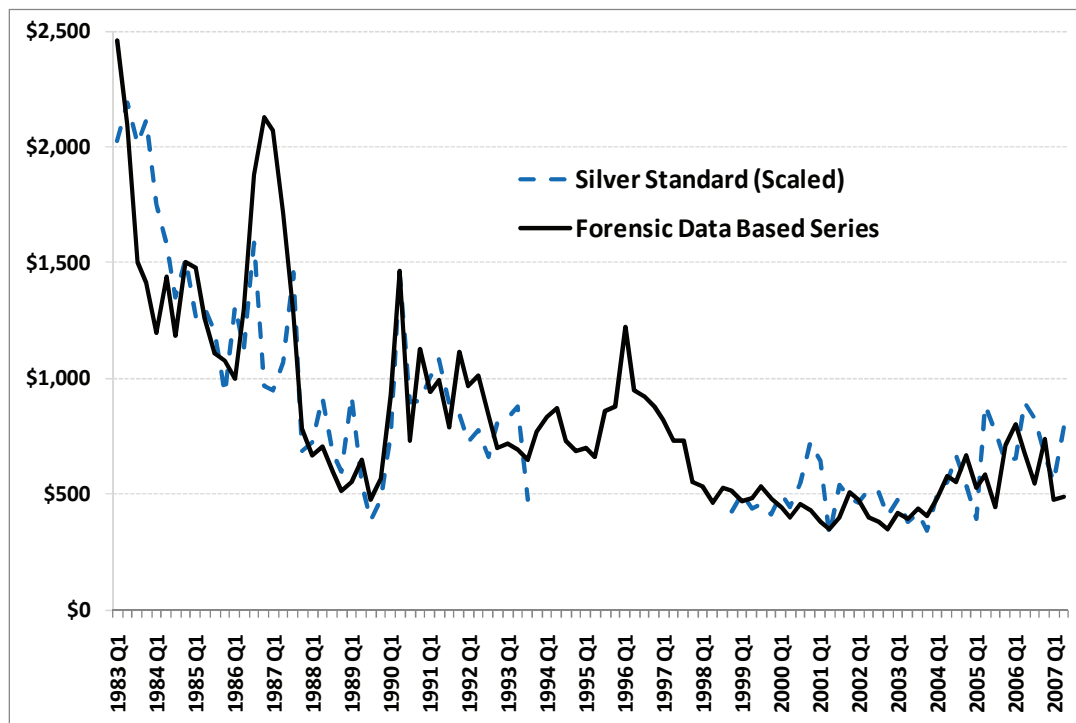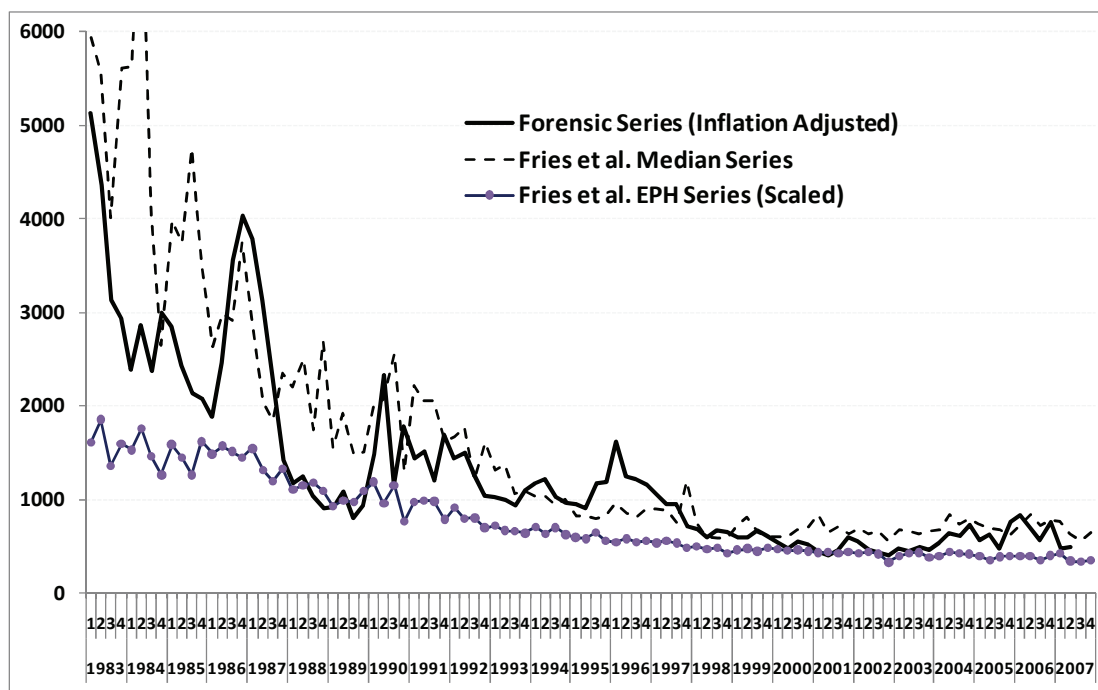

Figure A16: Heroin price per pure gram from forensic data for Washington DC also broadly parallels Fries *et al.*'s (2008) EPH and median series for the country as a whole

We also compared the forensic data price series with quarterly counts of heroin treatment admissions. Price was negatively correlated with TEDS treatment counts with respect to both the simple series (-0.44) and departures from their linear trends (-0.61).

5. Summary and discussion

The primary purpose of this paper is to explain a method whereby countries and cities that do not conduct many undercover purchases could still develop high-frequency indicators of purity-adjusted price, so long as they have forensic data on the purity of drug seizures.

We sought to validate that the resulting series by comparing them to series produced by the current standard method, a new gold standard series, and external problem indicators.

The value of price data has been explained elsewhere (e.g. Caulkins and Reuter, 1998). The particular value of having *high-frequency* price data has become apparent more recently, as the methods themselves improved enough to show that price fluctuations that are both real and brief do exist. While we intended the analysis to merely illustrate the reasonableness of the new price estimation method, one cannot help but notice two aspects of the series themselves that are of interest.

First, brief, sharp troughs in purity, and hence peaks in purity-adjusted prices, were not uncommon. They occur every year or two, on average, in the series we examined. Such events would be essentially invisible to annual price series, even if those annual series adjusted for purity. The general consensus that markets are rarely disrupted may need to be set aside for now, until the issue has been investigated with price series with finer temporal resolution.

Second, we observed purity troughs when there was essentially no change in the price per gram not adjusted for purity, including some prolonged ones that appeared in multiple locations. This suggests that even stability in a high-frequency series of prices not adjusted for purity should not be taken as strong evidence that purity adjusted prices are stable.

To draw the conclusion that drug markets are not being disrupted from time to time based on the price series most commonly used now (which is to say low-frequency series that are not adjusted for purity) would be akin to concluding that X-rays and radio waves do not exist because one cannot observe them by looking out the window. When the tool used for observing is inadequate to detect a phenomenon, no news is truly, no news. If one wishes to monitor that phenomenon, there is really no choice but to invest in obtaining a better measurement tool. This method introduced here may be one such tool.

References

Arkes J., Pacula R.L., Paddock S., Caulkins J.P., and Reuter P.2004. *Technical Report for the Price and Purity of Illicit Drugs Through 2003*. Santa Monica, CA: RAND, 2004.

Australian Crime Commission, *Illicit Drug Data Report, 2003-04*. Canberra, Australia: Australian Crime Commission, 2005.

Caulkins, Jonathon P., *Developing Price Series for Cocaine*. Santa Monica, CA: RAND, 1994.

Caulkins, Jonathon P., "Domestic Geographic Variation in Illicit Drug Prices," *Journal of Urban Economics,* Vol. 37, No.1, 1995, pp.38-56.

Caulkins, Jonathon P., "Modeling the Domestic Distribution Network for Illicit Drugs," *Management Science*, Vol. 43, No.10, 1997, pp.1364-1371.

Caulkins, Jonathon P., "Drug Prices and Emergency Mentions for Cocaine and Heroin," *American Journal of Public Health*, Vol. 91, No. 9, 2001, pp.1446-1448.

Caulkins, Jonathon P., "Price and Purity Analysis for Illicit Drugs: Data and Conceptual Issues," *Drug and Alcohol Dependence,* Vol. 90, 2007, pp.561-568.

Caulkins, Jonathon P. and Rosalie Liccardo Pacula, "Marijuana Markets: Inferences from Reports by the Household Population," *Journal of Drug Issues,* Vol. 36, No. 1, 2006, pp.173-200.

Caulkins, Jonathon P. and Rema Padman, "Quantity Discounts and Quality Premia for Illicit Drugs," *Journal of the American Statistical Association*, Vol. 88, No. 423, September 1993, pp.748-757.

Caulkins, Jonathon P. and Peter Reuter, "What Price Data Tell Us About Drug Markets," *Journal of Drug Issues* Vol. 28, No. 3, 1998, pp.593-612.

Caulkins, Jonathon P., Benjamin Gurga, and Christopher Little , "Economic Analysis of Drug Transaction 'Cycles' Described by Incarcerated UK Drug Dealers," *Global Crime*. Vol. 10, No. 1, 2009, pp. 94-112.

Clements, Kenneth.W., "Pricing and Packaging: The Case of Marijuana," *Journal of Business*. Vol. 79, No. 4, 2006, pp:2019-2044.

Crane, Barry D., A. Rex, Rivolo, and Gary C. Comfort, *An Empirical Examination of Counterdrug Program Effectiveness*, Alexandria, VA: Institute for Defense Analyses, 1997.

Cunningham, J. K. and L. M. Liu, "Impacts of federal ephedrine and pseudoephedrine regulations on methamphetamine-related hospital admissions," *Addiction,* Vol. 98, No. 9, September 2003 pp.1229-1237.

Cunningham, J. K. and L. M. Liu, "Impacts of federal precursor chemical regulations on methamphetamine arrests," *Addiction,* Vol. 100, No. 4, April 2005, pp.479-488.

Cunningham, James K. and Lon-Mu Liu, "Impact of methamphetamine precursor chemical regulation, a suppression policy, on the demand for drug treatment," *Social Science and Medicine,* Vol. 66, No. 7, April 2008, pp.1463-1473.

Cunningham, James K., Lon-Mu Liu, and Myra Muramoto, "Methamphetamine suppression and route of administration: precursor regulation impacts on snorting, smoking, swallowing and injecting," *Addiction,* Vol. 103, No. 7, 2008, pp.1174-1186.

DeSimone, Jeffrey S., "The Effect of Cocaine Prices on Crime," *Economic Inquiry,* Vol. 39, No. 4, October 2001, pp. 627–643.

DeSimone, Jeffrey S. and Matthew C. Farrelly, "Price and Enforcement Effects on Cocaine and Marijuana Demand," *Economic Inquiry,* Vol. 41, No. 1, January 2003, pp. 98-115.

Dobkin, Carlos and Nancy Nicosia, "The War on Drugs: Methamphetamine, Public Health, and Crime," *American Economic Review,* Vol. 99, No. 1, March 2009, pp. 324-349.

Frank, R.S., "Drugs of Abuse: Data Collection Systems of DEA and Recent Trends," *Journal of Analytical Toxicology*, Vol. 11, No. 6, 1987, pp. 237–241.

Fries, Arthur, Robert W. Anthony, Andrew Cseko, Jr., Carl C. Gaither, and Eric Schulman, *The Price and Purity of Illicit Drugs: 1981-2007*, Alexandria, VA: Institute for Defense Analyses, 2008.

Fry, Craig and Peter Miller, *Victorian Drug Trends 2001: Findings from the Illicit Drug Reporting System (IDRS),* Sydney, Australia: National Drug and Alcohol Research Centre, 2002.

Grossman, Michael, "Individual behaviours and substance use: the role of price," *Advances in Health Economics and Health Services Research*, Vol. 16, 2005, pp. 15-39.

Horowitz, Joel L., "Should the DEA's STRIDE Data Be Used for Economic Analysis of Markets for Illegal Drugs?" *Journal of the American Statistical Association*, Vol. 96, No. 456, 2001, pp. 1254–1271.

Hyatt, Raymond R., Jr. and William Rhodes, "The Price and Purity of Cocaine: The Relationship to Emergency Room Visits and Deaths, and to Drug Use Among Arrestees," *Statistics in Medicine,* Vol. 14, No. 5–7, March 15–April 15 1995, pp. 655–668.

Jacobson, Mireille, "Baby Booms and Drug Busts: Trends in Youth Drug Use in the United States, 1975–2000," *Quarterly Journal of Economics*, Vol. 119, No. 4, 2004, pp. 1481-1512

Kleiman, Mark A. R., *Against Excess: Drug Policy for Results*, New York: Basic Books, 1992.

Manski, Charles F., John V. Pepper, and Carol V. Petrie, eds., *Informing America's Policy on Illegal Drugs: What We Don't Know Keeps Hurting Us*, Washington DC: National Academy Press, 2001.

Moore, Mark H., "Policies to Achieve Discrimination on the Effective Price of Heroin," *American Economic Review*, Vol. 63, No. 2, May 1973, pp. 270-277.

Moore, Timothy J., Jonathon P. Caulkins, Alison Ritter, Paul Dietze, Shannon Monagle, and Jonathon Pruden, *Heroin Markets in Australia: Current Understanding and Future Possibilities,* Drug Policy Modelling Project Monograph Series, No. 9. Victoria, Australia: Turning Point Alcohol and Drug Centre Inc., 2005.

Office of National Drug Control Policy (ONDCP), *The Price of Illicit Drugs: 1981 through the Second Quarter of 2000*, Washington DC: The White House, 2001.

Office of National Drug Control Policy (ONDCP), *The Price and Purity of Illicit Drugs: 1981 Through the Second Quarter of 2003,* Washington DC: The White House, 2004.

Pacula, Rosalie Liccardo, Michael Grossman, Frank J. Chaloupka, Patrick M. O'Malley, Lloyd Johnston, and Matthew C. Farrelly, "Marijuana and Youth," in Jonathan Gruber, ed., *Risky Behaviour Among Youth: An Economic Analysis*, Chicago: University of Chicago Press, 2001, pp. 271-326.

Reuter, P. and J. P. Caulkins, "Illegal Lemons: Price Dispersion in Cocaine and Heroin Markets," *Bulletin on Narcotics*, Vol. LVI, No.s 1 & 2, 2004, pp. 141-165.

Rhodes, W., R. Hyatt, and P. Scheiman, "The Price of Cocaine, Heroin, and Marijuana, 1981-1993," *Journal of Drug Issues,* Vol. 24, No. 3, 1994, pp. 383-402.

Saffer, Henry, and Frank J. Chaloupka, "Demographic Differentials in the Demand for Alcohol and Illicit Drugs," in Frank J. Chaloupka, Michael Grossman, Warrick K. Bickel, and Henry Saffer, eds., *The Economic Analysis of Substance Use and Abuse: An Integration of Econometric and Behavioral Economic Research*, Chicago: University of Chicago Press, 1999, pp.187-211.

United Nations Office on Drugs and Crime (UNODC). *World Drug Report: 2004*, Washington DC: The White House, 2004.

Weatherburn, Don and Bronwyn Lind,. "The Impact of Law Enforcement Activity on a Heroin Market," *Addiction,* Vol. 92, No. 5, 1997, pp. 557-569.

Appendix B. Summary of major publicly-available datasets on drug supply and drug offences in the EU

Sponsor(s) / Dataset	Variables or activities	Drug(s)	Geographic scope	Years	Data collection method	Major limitations
Price						
EMCDDA Statistical Bulletin[A]	Retail prices (min, max, mean, modal)	Cannabis herb, cannabis resin, heroin brown, heroin white, crack, cocaine, amphetamine, methamphetamine, ecstasy, LSD	EU member states	Since "1995 in some countries, but usually from the end of the 1990s only"[B]	"undercover/test purchases (police, non-police), user surveys, law enforcement intelligence, key informants"[B]	Only covers retail; data collection method differs by country
UNODC World Drug Report[C]	Retail prices (range, typical), wholesale prices (range, typical)	Heroin, cocaine, cannabis herb, cannabis resin, amphetamine, methamphetamine, ecstasy	About 18 European countries	1990 - 2007 for some drugs, most recent available year for others	UN's ARQ Survey; data from Europol	Many country/years are missing; each country's methodology is unknown and may differ
Purity / Composition						
EMCDDA Statistical Bulletin[A]	Retail purity (min, max, mean, modal)	Heroin, cocaine, amphetamine, methamphetamine, ecstasy	EU member states	Since "1995 in some countries, but usually from the end of the 1990s only"[B]	"results from laboratory analyses, mostly forensic laboratories"[B]	Not exclusively based on retail transactions; data collection methodology differs by country; data generated by law enforcement activity may not be representative
UNODC World Drug Report[C]	Retail purity (range, typical), wholesale purity (range, typical)	Heroin, cocaine, cannabis herb, cannabis resin, amphetamine, methamphetamine, ecstasy	About 18 European countries	1990 - 2007 for some drugs, most recent available year for others	UN's ARQ Survey	Many country/years are missing; data collection methodology differs by country
Availability						
ESPAD[D]	Perceived availability (Likert scale)	Cannabis, amphetamines, ecstasy, tranquillisers/sedatives, inhalants	About 35 European countries	1995, 1999, 2003, 2007 (not all countries available all years)	Student survey	Target population not representative of rest of population; infrequent collection
Drug offenses and legal environment						

Sponsor(s) / Dataset	Variables or activities	Drug(s)	Geographic scope	Years	Data collection method	Major limitations
EMCDDA Statistical Bulletin[E]	Drug trafficking offences. Includes "offences such as drug production, trafficking and dealing"[E]	Cannabis, heroin, cocaine, crack, ecstasy, amphetamine, methamphetamine, LSD	EU member states	Depends on measure; some go as far back as 2000 or 1995	Reitox national focal points[A]	Not available by specific drug and offense (e.g., cocaine trafficking offenses); data collection methodology differs by country
Eurostat[F]	Drug trafficking (absolute numbers): "Drug trafficking includes illegal possession, cultivation, production, supplying, transportation, importing, exporting, financing etc. of drug operations which are not solely in connection with personal use."[G]	Unspecified	EU member states, candidate countries, EFTA/EEA countries, Australia, Canada, Japan, New Zealand, Russian Federation, USA, South Africa	1998-2007	Data come from official law enforcement reports in respective countries	Data collection methodology differs by country
European Sourcebook[H]	Drug trafficking offences and convictions, by country, by gender, minor status, alien status. Drug trafficking includes "possession, cultivation, production, sale, supplying, transportation, importation, exportation and financing of drug operations… as far	Unspecified	Over 40 European nations	1990-2003 (3 editions: 1990-1996, 1995-2000, 2000-2003)	Collected from member states; "a co-ordinated network of national correspondents provide[s] data from current statistical sources within each country... supplemented by the collection of information on statistical and legal definitions"[H]	Data collection methodology differs by country

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Sponsor(s) / Dataset	Variables or activities	Drug(s)	Geographic scope	Years	Data collection method	Major limitations
	as they are not in connection with personal use"[H]					
Seizures, Precursors, and Production						
UNODC Bi-Annual Seizure Report[I]	Seizure specific information, including drug type, place and date, quantity, origin and destination, transport method, nationality of traffickers[J]	Amphetamine-type substances, cocaine, marijuana/hashish, opiates[I]	Inconsistently available for EU member states, plus Switzerland, Croatia, Norway, Turkey, Russian Federation, Colombia, Peru, Bolivia, Afghanistan	2002 – 2008, bi-annually	Collected from member states	Data are presented without purity information; only available for seizures over a certain weight thresholds; inconsistently available for many MSs and drugs
EMCDDA[A]	Seizures, total numbers and quantities (kg, tablets, or units), by drug	"cannabis herb, cannabis resin, cannabis plants, heroin, cocaine, crack, ecstasy, amphetamine, methamphetamine, LSD"[B]	EU member states	"1985 for cocaine, heroin, amphetamine, ecstasy and LSD seizures (but not in all countries) 1995 for cannabis products, and crack seizures (but not in all countries) 2001 for methamphe-tamine seizures (but not in all countries)"[B]	"mostly aggregation of drug seizures reports at national level"[B]	Possibility of double counting[J]; data collection methodology differs by country; lack of differentiation between retail and wholesale markets
UNODC World Drug Report[K]	Seizures, by drug by country by year	Opium (raw and prepared), opium (liquid), opium (plant, capsule), heroin, morphine, other opiates, cocaine	Global, by country	As far back as 1984 (for certain substances) in 1999 WRD, 2002-2007 in most recent	"The United Nations Office on Drugs and Crime (UNODC) gathers information on illicit drug seizures worldwide, mainly drawn from the	Data collection methodology differs by country

Sponsor(s) / Dataset	Variables or activities	Drug(s)	Geographic scope	Years	Data collection method	Major limitations
		(base and salts), coca leaf, crack, cannabis herb, cannabis resin, cannabis oil, cannabis plant, cannabis seed, amphetamine, methamphetamine, non defined amphetamines, ecstasy (MDA, MDEA, MDMA), depressants (excluding methaqualone), non defined hallucinogens, LSD, methaqualone, non defined psychotropic substances		report	Annual Reports Questionnaire sent to all Member States, but also supplemented by other sources such as Interpol and UNODC Field Offices."	
UNODC RAS Online Database[L]	Seizures (by drug by weight/number by country)	Amphetamine, amphetamine-type stimulants, cannabis herb, cannabis oil, cannabis plant, cannabis resin, cannabis seed, coca leaf, cocaine (base and salts), crack, depressants (excluding Methaqualone), ecstasy (MDA, MDEA, MDMA), GHB, hallucinogens (excluding LSD but not excluding "ecstasy"), heroin, ketamine, khat, LSD, methadone,	Africa, Americas, Asia, Europe, Oceania, including sub-regions and countries	1980-2007	"The United Nations Office on Drugs and Crime (UNODC) gathers information on illicit drug seizures worldwide, mainly drawn from the Annual Reports Questionnaire sent to all Member States, but also supplemented by other sources such as Interpol and UNODC Field Offices."	Data collection methodology differs by country

Sponsor(s) / Dataset	Variables or activities	Drug(s)	Geographic scope	Years	Data collection method	Major limitations
		methamphetamine, methaqualone, opiates (not defined), opium (liquid), opium (plant, capsule), opium (poppy seed), opium (raw and prepared), other coca type, other opiates, psychotropic substances, volatile solvents (inhalants)				
UNODC World Drug Report / UNODC Global Illicit Drug Trends[M,N]	Seizures of illicit laboratories	Amphetamine group; methamphetamine group; ecstasy group; amphetamine and methamphetamine group; amphetamine, methamphetamine, and ecstasy group; cannabis group; coca group; other synthetic stimulants; depressant group; hallucinogen group; other	Global, by country, but most countries (and most EU countries) are missing	As far back as 1984-1997 in 1999 "Trends" report (for some substances),[N] up to 2006-2007 in most recent (2009) WDR	Reported by countries in Annual Report Questionnaire (ARQ) survey	Most countries missing; most EU countries missing; units differ between countries

Sponsor(s) / Dataset	Variables or activities	Drug(s)	Geographic scope	Years	Data collection method	Major limitations
CZ PRES Survey on Drug Crime Situation / Markets with special focus to aspects related to criminal group organised on ethnical/cultural principles, as perceived by specialised Police Squads in the 27 EU Countries	Seizures (drug rank by quantity seized)	Cocaine, heroin, marijuana, hashish, LSD, amphetamine, methamphetamine, ecstasy, GHB, phentanyl, ephedrine, other unspecified synthetic drugs	EU member states	2009	Survey of national police officials in EU	One-time survey; qualitative nature; reliant on opinion
DG TAXUD[O,P]	Number and quantity of seizures or stopped shipments of key drug precursors (both scheduled substances and non-scheduled substances), by precursor	23 precursors for scheduled substances, 17 precursors for non-scheduled substances	"in principle, from all EU member states - MSs are obliged to report, even if results are nil"[B]	2005-2007 in most recent (2007) report	"mostly aggregation of reports at national level"[B] "The EU Drug precursor legislation requires that Member States quarterly report to the European Commission the seizures and stopped shipments having occurred on their national territory."[O]	Few years for trend analysis; quantity unit is unclear
INCB[Q]	Seized precursors	Acetic anhydride, N-acetylanthranilic acid, ephedrine, ergometrine, ergotamine, isosafrole, lysergic acid, 3,4-MDP-2-P, 1-Phenyl-2-propanone, norephedrine, piperonal, potassium permanganate,	Global, by country		Reported by Member States	Many country/years are missing

Sponsor(s) / Dataset	Variables or activities	Drug(s)	Geographic scope	Years	Data collection method	Major limitations
		pseudoephedrine, safrole, acetone, anthranilic acid, ethyl ether, hydrochloric acid, methyl ethyl ketone, phenylacetic acid, piperidine, sulphuric acid, toluene,				
INCB[R]	Estimated requirements of narcotic drugs, in grams (amounts countries may legally have)	Various (dozens listed)	Global, by country		Reported by Member States	
INCB[R]	Exports and imports (kg) of raw materials and principal narcotic drugs	Opium, poppy straw, (M) , poppy straw (T), AMA, ATA, AOA, Thebaine, codeine, dihydro codeine, ethylmorphine, morphine, oxycodone, pholocodone, dextro propoxyphene, diphenoxylate, fentanyl, methadone, pethidine, tilidine, cocaine	Global, by country		Submitted by member states	Data collection methodology differs by country
INCB[T]	Psychotropic substance measures	Dozens of psychotropic substances (under schedules I-IV of Convention on Psychotropic Substances of 1971)	Global, by country		Reported by member states	Incomplete geographic coverage

Sources:

A. European Monitoring Centre for Drugs and Drug Addiction (EMCDDA). Statistical bulletin 2009: up to date statistics on the drug situation in Europe. 2009 EMCDDA. Available: http://www.emcdda.europa.eu/stats09, last accessed 22 October 2009.

B. RAND. Unpublished document. Annex 1 - Detailed information on data collections. 2009 RAND. (Forms alls services combined.doc)

C. United Nations Office on Drugs and Crime (UNODC). World Drug Report 2009. Statistical Annex – Prices. 2009 UNODC. Available: http://www.unodc.org/documents/wdr/WDR_2009/WDR2009_Statistical_annex_prices.pdf, last accessed 23 October 2009.

D. European School Survey Project on Alcohol and Other Drugs (ESPAD). ESPAD Reports. 2008 ESPAD. Available: http://www.espad.org/espad-reports, last accessed 22 October 2009.

E. European Monitoring Centre for Drugs and Drug Addiction (EMCDDA). Statistical bulletin 2009: up to date statistics on the drug situation in Europe. 2009 EMCDDA. Available: http://www.emcdda.europa.eu/stats09, last accessed 22 October 2009.

F. Eurostat. Eurostat Metadata in SDDS format: summary methodology. 2007 Eurostat. Available: http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/EN/crim_sm1.htm, last accessed 22 October 2009.

G. Eurostat. Statistics in focus. Population and Social Conditions. Crime and Criminal Justice. 2009 Eurostat. Available: http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-SF-09-036/EN/KS-SF-09-036-EN.PDF, last accessed 22 October 2009.

H. European Sourcebook Project. European Sourcebook of Crime and Criminal Justice Statistics. 2006. Available: http://www.europeansourcebook.org, last accessed 22 October 2009.

I. United Nations Office on Drugs and Crime (UNODC). Bi-Annual Seizure Report 2008/2. 2009 UNODC, Division for Policy Analysis and Public Affairs, Policy Analysis and Research Branch, Statistics and Surveys Section. Available: http://www.unodc.org/documents/data-and-analysis/seizures/BASR20082.pdf, last accessed 22 October 2009.

J. Noor A, Costa-Storti C. Monitoring: markets, crime and supply reduction. Presentation, Brussels, 2009, EMCDDA. (EMCDDAforCommission_Rand_Supply_ReductionV3.ppt)

K. United Nations Office on Drugs and Crime (UNODC). World Drug Report 2009 - Seizures. 2009 UNODC. Available: http://www.unodc.org/documents/wdr/WDR_2009/Seizures_Tables.pdf, last accessed 22 October 2009.

L. United Nations Office on Drugs and Crime (UNODC). Research database. 2009 UNODC. Available: http://www.unodc.org/unodc/en/data-and-analysis/Research-Database.html, last accessed 22 October 2009.

M. United Nations Office on Drugs and Crime (UNODC). World Drug Report 2009. Manufacture seizures of illicit laboratories reported for 2006-2007. 2009 UNODC. Available: http://www.unodc.org/documents/wdr/WDR_2009/WDR2009_Lab-seizures.pdf, last accessed 22 October 2009.

N. United Nations Office on Drugs and Crime (UNODC). Global Illicit Drug Trends. 2009 UNODC. Available: http://www.unodc.org/unodc/en/data-and-analysis/global_illicit_drug_drug_trends.html, last accessed 22 October 2009.

O. European Commission Taxation and Customs Union (EC-DG TAXUD). Summary report on EU drug precursors seizures 2007. Available: http://ec.europa.eu/enterprise/sectors/chemicals/files/new_page/report_2007_en.pdf, last accessed 22 October 2009.

P. European Commission Taxation and Customs Union (EC-DG TAXUD). Summary report on EU drug precursors seizures 2006. Available: http://ec.europa.eu/taxation_customs/resources/documents/customs/customs_controls/drugs_precursors/seizures/report_2006_en.pdf, last accessed 22 October 2009.

Q. International Narcotics Control Board (INCB). Precursors and chemicals frequently used in the illicit manufacture of narcotic drugs and psychotropic substances. 2008 INCB. Available:

http://www.incb.org/pdf/precursors-report/2008/en/PRE_Rep2008_English.pdf, last accessed 22 October 2009.

R. International Narcotics Control Board (INCB). Estimated world requirements of narcotic drugs in grams for 2009 (September Update). 2009 INCB. Available: http://www.incb.org/pdf/e/estim/2009/EstSep09.pdf, last accessed 22 October 2009.

S. International Narcotics Control Board (INCB). Narcotic drugs statistical tables. 2009 INCB. Available: http://www.incb.org/incb/en/narcotic_drugs_stat_tables.html, last accessed 22 October 2009.

T. International Narcotics Control Board (INCB). Psychotropic substances 2008. 2008 INCB. Available: http://www.incb.org/pdf/technical-reports/psychotropics/2008/psy_2008.pdf, last accessed 22 October 2009.

Appendix C. Data collected about drug prices, purity and seizures in 3rd countries

	Australia					Canada					United States				
	Data Source	M	C	H	A	Data Source	M	C	H	A	Data Source	M	C	H	A
PURITY															
Forensic lab analysis of national law enforcement &/or custom samples (minimum, median, maximum and/or average)	ACC		X	X	X	DAS	X	X	X	X	NFLIS	X	X	X	X
Forensic lab analysis of sub-national law enforcement samples (minimum, median, maximum and/or average)	ACC		X	X	X	DAS	X	X	X	X	NFLIS	X	X	X	X
Self-reported purity	IDRS	X	X	X	X	NA					NA				
	ERDRS	X	X	X	X										
RAW PRICE or EXPENDITURE															
Expenditure on drugs in last (week, purchase)	IDRS	Any drug				NA					ADAM	X	X	X	X
Price – law enforcement, retail	ACC	X	X	X	X	RCMP	X	X	X	X	STRIDE	X	X	X	X
Price – law enforcement, wholesale	ACC	X	X	X	X	NA					STRIDE	X	X	X	X
Price – self-report	IDRS	X	X	X	X	NA					ADAM	X	X	X	X
											NSDUH	X			
PURITY ADJUSTED PRICE															
Undercover purchases by law enforcement	NA					NA					STRIDE		X	X	X
PURCHASE PATTERNS															
Quantity/Expenditure last purchase	NDSHS	X				NA					ADAM	X	X	X	X
											NSDUH	X			
Where do you usually obtain drug X?	NDSHS		X	X	X						ADAM	X	X	X	X
											NSDUH	X			
											MTF	X		X	X
Location of last buy	DUMA	X	X	X	X						ADAM	X	X	X	X
	ERDRS	X	X	X	X						NSDUH	X			

	Australia					Canada					United States				
	Data Source	M	C	H	A	Data Source	M	C	H	A	Data Source	M	C	H	A
Method for contacting dealer	DUMA	X	X	X	X						ADAM	X	X	X	X
											NSDUH	X			
Place of purchase (house, street, home delivery)	DUMA	X	X	X	X						ADAM	X	X	X	X
	IDRS	X	X	X	X						NSDUH	X			
Retail source (regular, occasional, new)	DUMA	X	X	X	X						ADAM	X	X	X	X
	IDRS	X	X	X	X						NSDUH	X			
AVAILABILITY / SEARCH TIME															
How easy is it to get drug X at the moment?	IDRS	X	X	X	X	RSDUS	X	X			MTF	X			X
Has this changed in the last X month(s) / year?	IDRS	X	X	X	X	RSDUS	X	X			MTF	X			X
SEIZURES															
Number of seizures – national system (number, date, total weight, method of transport)	Australian Customs Service & ACC	X	X	X	X	Controlled Drugs and Substances Database & RCMP	X	X	X	X	STRIDE	X	X	X	X
Number of seizures – sub-national system	ACC	X	X	X	X	Controlled Drugs and Substances Database & RCMP	X	X	X	X	NFLIS	X	X	X	X
Laboratory detections / seizures	ACC		X	X	X	RCMP	X			X	NCLD				X

NOTES: M=Marijuana/Hashish; C=Cocaine/Crack; H=Heroin; A=Amphetamine-type substances

Australia

ACC   Australian Crime Commission

DUMA   Drug Use Monitoring Australia (DUMA)

ERDRS	Ecstasy and Related Drugs Reporting System
IDRS	Illicit Drug Reporting System (IDRS)
NDSHS	National Drug Strategy Household Survey (NDSHS)

Canada

DAS	Drug Analyses Services at Canada Health
RCMP	Royal Canadian Mounted Police Drug Situation Report
RSDUS	Regional Student Drug Use Surveys

United States

ADAM	Arrestee Drug Abuse Monitoring Program
MTF	Monitoring the Future
NCLS	National Clandestine Laboratory Database
NFLIS	National Forensic Laboratory Information System
NSDUH	National Survey on Drug Use and Health
STRIDE	System to Retrieve Information from Drug Evidence