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Drug affordability–potential tool for comparing illicit drug markets

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ABSTRACT

Background: The importance of illicit drug price data and making appropriate adjustments for purity has been repeatedly highlighted for understanding illicit drug markets. The European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) has been collecting retail price data for a number of drug types alongside drug-specific purity information for over 15 years. While these data are useful for a number of monitoring and analytical purposes, they are not without their limitations and there are circumstances where additional adjustment needs to be considered. This paper reviews some conceptual issues and measurement challenges relevant to the interpretation of price data. It also highlights the issues with between-country comparisons of drug prices and introduces the concept of *affordability of drugs*, going beyond purity-adjustment to account for varying national economies.

Methods: Based on a 2015 European data set of price and purity data across the heroin and cocaine retail markets, the paper demonstrates a new model for drug market comparative analysis; calculation of *drug affordability* is achieved by applying to purity-adjusted prices 2015 Price Level Indices (PLI, Eurostat).

Results: Available data allowed retail heroin and cocaine market comparison for 27 European countries. The lowest and highest unadjusted prices per gram were observed for heroin: in Estonia, Belgium, Greece and Bulgaria (lowest) and Finland, Ireland, Sweden and Latvia (highest); for cocaine: the Netherlands, Belgium and the United Kingdom (lowest) and Turkey, Finland, Estonia and Romania (highest). The affordability per gram of heroin and cocaine when taking into account adjustment for both purity and economy demonstrates different patterns.

Conclusion: It is argued that purity-adjusted price alone provides an incomplete comparison of retail price across countries. The proposed new method takes account of the differing economic conditions within European countries, thus providing a more sophisticated tool for cross-national comparisons of retail drug markets in Europe. Future work will need to examine other potential uses of the *drug affordability* tool.

Limitations: The limitations of this measure reflect primarily the limitations of the constituent data; in addition to issues inherent in collecting accurate data on illicit markets, analysis that relies on data collected from multiple countries is susceptible to discrepancies in data collection practices from country to country.

Introduction

The development of indicators capturing specific facets of illicit drug markets has gained priority in recent years. In line with the Council conclusions on improving the monitoring of drug supply in the European Union (2013), the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) is leading on a programme of activities to increase the accuracy, reliability, comparability and overall quality of data on the supply side of the drugs phenomenon. Illicit drug price data is considered an essential element for understanding drug markets.

Efforts have been made to add value to price data, including the construction of measures such as purity-adjusted prices. These measures can make the data more useful for analyses and research. However, when performing cross-national comparisons there are other significant factors that are not being addressed by existing measures and tools. This paper presents a new analytical approach that takes account of economic differences between countries, allowing more meaningful comparative analysis.

Background

There is a growing body of literature on the use of these data in

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general and on the importance of the relationship between drug prices and aspects of wholesale and retail market activity:

- price data have been used to infer heroin trafficking networks and flows into Australia (Moore et al., 2005) and heroin and cocaine into Europe (Chandra & Joba, 2015; Chandra, Peters, & Zimmer, 2014; Chandra & Barkell, 2013);
- Moore et al. (2005) demonstrated a relationship between heroin price and harm (in this case overdose);
- Sarrica (2008), using data for Europe and the USA established a relationship between drug prices and drug-related systemic violence;
- the relationship between illicit drug price and risk has been examined (e.g. Reuter & Greenfield, 2001; Miron, 2003; Caulkins & Reuter, 2011).

An obvious determinant of price is supply. With regard to heroin and cocaine, it can be asserted that because the demand for these drugs is relatively stable (EMCDDA, 2016), any price fluctuations occur due to variations in supply. The effectiveness of law enforcement can influence prices although the extent of this influence is debatable (Reuter, Pollack, & Pardo, 2016in Report of the LSE Expert Group on the Economics of Drug Policy, 2016). Furthermore, numerous other factors can be hypothesized, such as the resilience of supply chains (Reuter et al., 2016), and these will likely vary at different market levels.

Key differences between illicit drug markets and conventional licit markets were drawn by Kleiman more than two decades ago (1992) and they remain valid. Additional observations have been made, for different market levels from economic or policy perspectives (Caulkins, 2007; Reuter, various publications). Essential points are:

- *Paucity of product information.* It has been observed (e.g. Caulkins, 2007) that for drugs such as heroin and cocaine there may be five or six transactions between importation in multi-kilogram and retail transaction, and the drug may be diluted at each step. Hence users and retail-sellers (possibly also lower-level wholesalers) may have severely limited information about purity;
- *Consistent price but variable purity*. There is evidence that retail pricing for a set transaction size (e.g. a 'bag' of heroin, notionally 0.2 g) remains stable over time. Instead, variations in availability and other factors are factored in by changing the purity. This is demonstrated by the heroin market in Europe during 2010–11 when several EU countries reported heroin shortages – prices remained fairly stable but there was a marked dip in heroin purity (EMCDDA, 2016).

For the reasons above, price alone is generally not especially informative. Purity-adjusted prices, in addition to individual price and purity indicators, has been put forward as an important measure of markets (Pacula, Kilmer, & Hunt, 2010). Adjusting the retail price of a drug for purity mitigates against purity fluctuation and can give a more accurate picture of the level of supply of that drug to the market.

Purity-adjusted prices can be a valuable tool for monitoring and analysis of national drug markets. However, they are of limited relevance when performing cross-national comparisons as they do not reflect socio-economic differences between countries. A country's level of wealth will have a considerable bearing on the pricing of illicit drugs – and purity-adjusted prices do not account for this. To date no analysis known to the authors has explored the potential of incorporating a credible measure of the level of national economies when making cross-national comparisons of markets. Adjustment of illicit drug price to account for varying national economies may also be necessary when studying the real cost of drugs in a given country.

The measurements required to produce any of these indicators are subject to a number of difficulties and uncertainties:

- Range of different sources and data collection practices. There is considerable variability in the type of information systems (police sources, surveys among drug users etc.) and the sampling methods used to produce retail price data across the reporting countries;
- Geographical coverage and sampling over time, representativeness. Data are often submitted as national and annual 'summary measures'. However, in some cases, they come from local rather than national monitoring systems, and/or represent a measurement from a limited time frame as opposed to an annual average.
- Uncertainty about the method(s) employed to calculate the averages. Countries differ in the methods they use to construct a final national annual price per drug (typical/modal values, simple/weighted means).

Despite these measurement challenges, which hold for purity data also, we are confident that meaningful indicators can be derived from primary price and purity data. Drawing from our experience over the past two decades in setting frameworks for the collection of retail price data for a number of illicit drug types alongside drug-specific purity information, the rest of this paper presents an analytical approach, based on the concept of *affordability* of drugs, that goes beyond purity adjustment to account for differing economic conditions within EU countries, using Price Level Indices (PLI).

Data and methodology

For the purpose of this study, two types of data are used – retail-level primary price and purity for heroin and powder cocaine. Both are collected by the EMCDDA through its network of national focal points on an annual basis. The prices, reported in the local currency, are converted to Euro prices using mean annual EU[1] exchange rates for the year in question, thus making them directly comparable, regardless of the original currency. For purity data, simple mean values are suitable and used in this analysis. For price data, to ensure the most representative comparisons, mode (typical) prices are preferred, to conduct the adjustment from *primary price* to *affordability*. Other measures (e.g. ranges, means) take in anomalies at either end of the scale, which may skew the representativeness of the data, while the mode establishes the price most commonly encountered and thus provides a better understanding of the market. EMCDDA price data collection protocol emphasizes a preference for the mode although other measures may be reported. For countries for which typical prices were not reported, the average values were used; where the typical or average was not reported, the mean of the maximum and minimum prices was reported instead. Due to the exploratory nature of the analyses presented here, missing data were not imputed or drawn from other sources to fill in the gaps. The primary data are error prone though EMCDDA staff check the data and resolve any obvious mistakes in the reporting of purities, prices or currencies. Because of the illicit nature of the drug market, it is not always possible to use representative sampling methods for data collection. Therefore, the data should be viewed as indicative of trends rather than as precise and reliable statistics, and the specific findings should be seen in this context.

The calculation to achieve adjustment for purity is:

$$PAPc = \frac{\text{PRIMARY PRICE}c \times 100}{\text{REPORTED PURITY}c}$$

$$PAP(\text{purity} - \text{adjusted price})$$
$$c(\text{country})$$

It is acknowledged that 100% pure heroin is not available within the market (not least as production by-products remain). However, as a levelling calculation to compare across Europe, this affords an opportunity to adjust price for purity.

[1] http://ec.europa.eu/budget/contracts_grants/info_contracts/inforeuro/index_en.cfm.