How Do Illicit Drugs Move across Countries? A Network Analysis of the Heroin Supply to Europe

Luca Giommoni[1], Alberto Aziani[2] and Giulia Berlusconi[3]

[1] *Cardiff University, School of Social Sciences*

[2] *Università Cattolica del Sacro Cuore and Transcrime*

[3] *National University of Ireland, Maynooth*

Corresponding author:

Luca Giommoni

School of Social Sciences, Cardiff University, UK

Glamorgan Building King Edward VII Avenue,

Cardiff CF10 3WT, Wales, UK

Tel: 02920874436

Email: giommonil@cardiff.ac.uk

Biographical notes on contributors:

Luca Giommoni is a Lecturer in criminology at School of Social Sciences (Cardiff University). His research interests include drug policy analysis, cross-country comparability of data on illegal drugs and online drug markets.

Alberto Aziani is a Ph.D. candidate in Criminology at the Università Cattolica in Milan and a researcher at Transcrime. He received a Master's degree in Economics and Social Sciences at Università commerciale Luigi Bocconi in Milan.

Giulia Berlusconi is a Postdoctoral Researcher at the National University of Ireland, Maynooth. Her research interests include organised and serious crime, illicit networks, and the application of social network analysis in criminology.

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Illicit drugs are trafficked across manifold borders before ultimately reaching consumers. Consequently, interdiction of cross-border drug trafficking forms a critical component of the European Union's initiative to reduce drug supplies. However, there is contradictory evidence about its effectiveness, which is due, in part, to a paucity of information about how drugs flow across borders. This study uses a network approach to analyse international drug trafficking both to and within Europe, drawing on several perspectives to delineate the factors that affect how drug shipments move across borders. The analysis explicates how drug trafficking is concentrated along specific routes; moreover, we demonstrate that its structure is not random, but, rather, driven by specific factors. In particular, corruption, social and geographical proximity are key factors explaining the configuration of heroin supply to European countries. This study also provides essential insights into the disruption of traffickers' illicit activities.

Introduction

Illicit drugs, especially heroin and cocaine, travel across multiple borders before reaching consumer markets (Caulkins, 2015). Although, in principle, drug traffickers have a plethora of suitable routes through which to move illicit drugs, in actuality drug trafficking is concentrated along specific routes, as countries generally have a limited number of trading partners (Boivin, 2013, 2014a; EMCDDA & EUROPOL, 2013; UNODC, 2015d). In this critical respect, the international trade network of illicit drugs is indeed less dense than that which pertains to legal commodities (Boivin, 2013, 2014a).

The concentration of drug trafficking along a few specific routes follows well established trends of other forms of criminal behavior. Indeed, an extensive corpus of criminological literature now demonstrates how crime is not uniformly distributed and some areas have higher crime rates than others (Curman, Andresen, & Brantingham, 2014; Sherman, Gartin, & Buerger, 1989; Weisburd & Amram, 2014; Weisburd, Groff, & Yang, 2012). These findings form the cornerstone of the so-called hot-spot policing approach (Weisburd, 2015). The underlying logic of this approach is that law enforcement resources should be concentrated within the areas where crime most commonly occurs (Sherman et al., 1998). Several studies went one step further and identified the characteristics of these 'hot' areas (Eck, Clarke, & Guerette, 2007; Smith, Frazee, & Davison, 2000; Weisburd et al., 2012; Wikström, 2012), establishing how socioeconomic (e.g., low income, ethnic heterogeneity, residential instability) and physical features (e.g., land use and presence of risky facilities) of places can help us account for crime concentration. Such research was invaluable in terms of providing an evidence-base from which to both efficiently manage police resources, and to design social interventions aimed at tackling the root causes of crime (Weisburd, Groff, & Yang, 2013).

The disruption of illicit drug trafficking, both within the European Union (EU) and along its external borders, constitutes a key priority of the EU Drugs Strategy (2013-2020) (Council of the European Union, 2012). Yet, evidence pertaining to the effectiveness of current interdiction programmes is contradictory at best (Collins, 2014). For example, traffickers adapt to interdiction programmes by either changing their modes of transportation and hiding techniques, or shifting to alternative routes (Friesendorf, 2005; Manski, Pepper, & Thomas, 1999; Reuter, 2014; Seccombe, 1995; Windle & Farrell, 2012). The latter form of adaptation is often referred to as the 'balloon effect', and suggests that stronger law enforcement actions in one location will result in the displacement of drug trafficking activities to another location (Friesendorf, 2005; Hawdon & Kleiman, 2011; Reuter, 2014). The balloon analogy derives from the similarity between this dynamic and that of incompressible fluids that move toward areas of lower resistance when under pressure (Mora, 1996). Consequently, eradications, seizures, and other drug control interventions taking place in one country may damage others if coordination schemes are scant (Chouvy, 2012; Mora, 1996; Reuter, 2014). The emergence of a supply route of cocaine to Europe via Africa following the instantiation of increased level of controls between the Netherlands and the Netherlands Antilles, is a recent example which testifies to the notorious balloon effect and the limits of interdiction programmes (Reuter, 2014; UNODC, 2007, 2013).

The concentration of drug trafficking along specific routes also suggests that traffickers are driven by specific motives (Boivin, 2014a; Reuter, 2014; UNODC, 2015c). The understanding of how and why crime focuses within particular areas proved to be integral to the introduction of new criminal justice and social interventions aimed at reducing crime. Similarly, one would think that gaining insights into the concentration of drug trafficking along specific routes could also aid efforts to identify the most effective counter-policies, evaluate the consequences of interdiction programmes, and anticipate the possible displacement of traffickers' illicit activities because of such programmes. However, there has hitherto been a dearth of empirical research investigating which factors shape the geographic configuration of international drug trafficking and why it concentrates along a specific and limited range of paths (Trumbore & Woo, 2014).

The present contribution investigates the determinants of the geopolitical configuration of heroin supply to European countries. It draws from several disciplines (i.e., criminology, macroeconomics, and geography) to explain what factors determine how drug shipments move across countries. The reason for our focus on the trafficking of heroin to Europe is twofold. First, heroin consumption still accounts for a large share of drug-related health and social costs in Europe (EMCDDA, 2015). For example, forty experts from across the EU recently judged heroin to be the most harmful illicit psychoactive substance in Europe, as well as the second most harmful overall with respect to sixteen harm criteria (van Amsterdam, Nutt, Phillips, & van den Brink, 2015). The purity of the heroin available in certain European markets, and therefore its potential harm, is increasing alongside the number of overdose deaths (EMCDDA, 2015). Second, Europe has a large availability of country-level data. As concluded in the first European Conference on Drug Supply Indicators "[…] a considerable amount of data on drug supply is already being collected in a systematic way across the EU, and the way forward is to build on what already exists […]" (EMCDDA, 2010, p. 7). Despite this article's focus, the methodological approach can be replicated and adapted to other geographic areas, illicit substances (e.g., cocaine, cannabis), and illicit markets (e.g., trafficking in human beings).

The article is structured as follows. The second section reviews literature on the manifold factors that shape international drug trafficking, in addition to outlining the theoretical framework.

The third section introduces the empirical methodology, before proceeding to discuss the data, the analytical strategy mobilised in the article, and its limitations. The fourth section presents and discusses the results. The article concludes by delineating the emergent research and policy implications.

Theoretical perspective on international drug trafficking

Current knowledge of the various factors underpinning the geopolitical configuration of transnational drug trafficking routes is limited, both theoretically and empirically – in fact, it is practically absent in the latter instance (von Lampe, 2012). While a range of authors, such as Caulkins, Crawford, and Reuter (1993), Akyeampong (2005), Decker and Townsend-Chapman (2008), Paoli and Reuter (2008), and Kleemans (2013) provide some valuable insights, there is neither a systematic knowledge-base or established framework from which to explicate the geographical configuration of transnational drug trafficking routes. The contribution by Reuter (2014), centres on three models, and marks the sole attempt to systematically organize knowledge about how smugglers choose drug routes.

The first model is founded upon the idea that the costs imposed by law enforcement authorities, such as loss of shipments, confiscation of assets and, more importantly, incarceration, are the principal costs for drug traffickers (Caulkins & Reuter, 1998; Kuziemko & Levitt, 2004; Reuter & Kleiman, 1986). Resultantly, the more national law enforcement agencies increase these costs, the less attractive a country will be (Reuter, 2014).

The second model identifies geographical proximity to the main producer or consumer countries as an important risk factor for becoming a transhipment country, as travelling long distances increases transportation costs as well as the risk of interception and arrest (Reuter, 2014). As Reuter (2014) points out, both the proximity of Mexico to the United States and the Balkan countries to Western Europe is a crucial factor in their pivotal role in the trafficking of cocaine and heroin, respectively.

In the third model, Reuter (2014) argues that social ties among countries, such as migration patterns, may shape drug trafficking routes. With regards to the drug trade in Western

Europe for example, Paoli and Reuter (2008) found that Turkish and Albanians dominate both the import and retail distribution of heroin, while Colombians have a leading role in the import of cocaine from South America. Along with the relative proximity to production or key trafficking countries, a large immigrant diaspora in several European countries is a common trait of these ethnic groups. In a similar vein, Nigerian traffickers are now increasingly playing an important role in the trafficking of cocaine. Despite Nigeria's distance from any significant producer or consumer country, the migration of three million Nigerians to Southeast Asia, the United States, Latin America, and Europe goes some way to helping us explain this emergent dynamic (Paoli & Reuter, 2008). Whilst easy access to suppliers and fertile ground for corruption may constitute a competitive advantage to be exploited in transnational drug trafficking activities, other authors stress the relevance of diasporas and social networks as crucial assets for transnational crimes in general (van Duyne, 1993; Kleemans & van De Bunt, 1999; Bruinsma & Bernasco, 2004; Soudijn & Kleemans, 2009) and drug trafficking specifically (Zaitch, 2002; Akyeampong, 2005).

This study, following the aforesaid framework elaborated by Reuter (2014), develops three hypotheses for the purposes of understanding the geopolitical configuration of the international supply of heroin to Europe. The first hypothesis relates to the claim that the routes offering high economic returns and low risks of interception are more likely to be used to traffic drugs. The "risks and prices" model developed by Reuter and Kleiman (1986) postulates that traffickers are rational actors who seek to maximize profits and reduce risks. According to this perspective, countries imposing lower costs, namely a lower risk of interception and higher profits for traffickers, should be more likely to import and/or export heroin. Similarly, corrupt officials reduce the risk of interception and thus facilitate drug trafficking, although bribing custom officers may represent initial costs for traffickers (Desroches, 2007; Greenfield & Paoli, 2012; Van Dijk, 2007; Trumbore & Woo, 2014). Boivin (2014b) found that price mark-ups tend to be lower in destination countries with high levels of corruption. This confirms that the monetary costs for bribing custom officials are lower than the non-monetary costs of a higher risk of arrest or seizure (Reuter & Kleiman, 1986).

The second hypothesis states that heroin flows are more likely to occur within countries that are geographically close to each other. As Reuter (2014) notes, geographic proximity can reduce the costs associated with drug trafficking. Indeed, several studies have documented the negative effect of geographic distance on legal trade. In a meta-analysis of 103 studies, Disdier and Head found that a 10% increase in distance lowers legal trade by about 9% (2008, p. 37). The effect of geographic distance on illegal trade is even larger. Caulkins and Bond (2012, p. 40) calculated that the price of marijuana in the United States increased by about USD 325 to USD 475 per pound per 1,000 miles of distance from Mexico. Since traffickers operate under the threat of law enforcement authorities, longer distances involve longer exposure to risk of interception and arrest.

The third hypothesis predicts that countries that are socially closer are more likely to be connected to each other than countries that are not. As Reuter argues (2014), besides geography, certain social factors, such as migration flow between two countries, may facilitate trafficking between them. Several studies in macroeconomics, for example, point out that social proximity between countries reduces the barriers for legal trade by providing opportunities for businesses and easier access to valuable information (Ghemawat, 2001; Prashantham, Dhanaraj, & Kumar, 2015; Rauch, 1999; Sgrignoli, Metulini, Schiavo, & Riccaboni, 2015). Therefore, it is reasonable to assume that the effect of social proximity would also apply to illegal trading, inasmuch as participants cannot rely on legal institutions to solve their disputes. That is to say, traffickers need to agree on quantity, purity, conditions of the shipment, and payment. They may also need to deal with unexpected and hostile situations (i.e., seizure of the shipment) where the two parties need to find a common solution (Lameli, Nitsch, Südekum, & Wolf, 2013). Speaking the same language, sharing the same socio-cultural background or coming from the same institutional setting increase trust in the partner and reduce transaction costs (Combes, Lafourcade, & Mayer, 2005; Kleemans & van De Bunt, 1999; Paoli & Reuter, 2008).

Language and cultural affinity facilitate cross-border transactions by providing traders with the opportunity to rely on non-economic, socio-cultural factors (e.g., reputation and trust of suppliers, ethnic ties) to find international partners and to reduce uncertainties in trading (Lee &

Park, 2016; Sgrignoli et al., 2015). As observed in legal trading, pre-existing ties are a determinant factor during the search for a trading partner, and informal networks also play a key role in shaping international trade (Rauch, 1999). For example, informal networks may sanction violations of the trafficking agreements by blacklisting the deviant partner and excluding him/her from future deals (Rauch & Trindade, 2002). Especially in the context of illicit industries, pre-existing ties rather than market-driven reasons (i.e., profits or dimension of the market) may lead to the decision to export to specific countries.

Data and methods

The heroin trafficking network

Following the work of Paoli, Greenfield, and Reuter (2009), this study conceives of international drug trafficking as a series of trading relations among countries. Although the authors do not use network analysis techniques, they employ a framework and terminology (e.g. "flow model") in line with this approach. This is also consistent with other researchers who have subsequently utilised a social network approach to study the international trafficking of illicit drugs (Boivin, 2013, 2014b, 2014a; Chandra & Joba, 2015).

Data on heroin trafficking network to and within Europe derives from seizure cases reported in the UNODC Individual Drug Seizure (IDS) database that contains information about the origin, transit, and destination of shipments seized (Boivin, 2011, 2013, 2014b; UNODC, 2015c). This information is used to identify the pairs of countries exporting and importing heroin with each other and, in turn, to establish the position of each country in the international heroin trafficking network. Table 1 reports an example of the IDS dataset structure.

TABLE 1 ABOUT HERE

The heroin trade network includes all European countries for which data are currently available (N=36) and all non-European countries (N=25) who import from or export to Europe, as according to seizure cases that occurred between 2007 and 2012 (UNODC, 2014a).[1] For instance, a seizure of heroin destined for Italy occurring on the border between Slovenia and

Croatia provides evidence for two connections: firstly, between Italy and Slovenia; and, secondly, between Croatia and Slovenia (Boivin, 2013).

The IDS database provides 10,378 different dyads determining 325 pairs of countries.[2] In 138 of these 325 cases, the connection accounts for less than 1% of the seizures taking place as the goods were being imported into the country. These connections are likely to represent weak or sporadic links between countries and, consequently, are not included within our analysis here. The final network corresponds to 187 pairs of countries.

Independent variables

This study uses both nodal and relational attributes data in order to understand what factors make up the European heroin trafficking network. Nodal attributes refer to specific features of importing countries, such as the level of corruption, whereas relational attributes provide information about the links between any two given countries (e.g., number of migrants from one country to another). Table 2 reports the independent variables used in the analysis along with the source, reference period and nature of the variable (i.e., nodal or relational attribute).

TABLE 2 ABOUT HERE

According to our first hypothesis, traffickers are more likely to ship drugs to countries where there are lower risks of interception or higher profits are likely to be procured. The study operationalizes the concept of risk in terms of law enforcement and corruption; profits are operationalized in terms of price mark-ups and market size. It is important to note that measuring the level of enforcement across countries presents several issues. Firstly, data on drug-related arrests are generated by national legal systems and thus differ dramatically across countries. Secondly, offences can be registered at different stages (e.g., when reported to law enforcement agencies, after investigation), notwithstanding that countries may use different thresholds to discern sales from personal use and employ different counting rules (Kilmer, Reuter, & Giommoni, 2015). Lastly, and most importantly, there is no available data on drug-related offences for several of the countries included within this analysis.

Given the limitations of trying to use proxies for the level of enforcement across countries, a twofold approach is adopted here. The first uses the presence of police forces (rate per 100,000 population) and seizure rate (quantity of heroin seized per 100,000 population) in each country as nodal attributes with which to proxy law enforcement capacity, arrest traffickers and to intercept shipments (Boivin, 2014c; Keefer, Loayza, & Soares, 2008; Soares, 2004). The second approach substitutes the police rate for the law and order index from the International Country Risk Guide (The PRS Group, Inc., 2015). This index measures both the impartiality of the legal system and the ability of a country to effectively enforce the law. The index ranges from 1 (weak level of law and order) to 6 (high level of law and order). Hernandez and Rudolph (2015) used the law and order index as a proxy for the level of enforceability, and found that it is related negatively to human trafficking flows.

The hypothesis that corruption facilitates drug exchanges between countries is tested by introducing into the model the level of corruption as measured by the World Bank, i.e., perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption.[3]

Profit maximisation is taken into account by including within the model the differences in wholesale prices between any two countries (measured in USD/kg) and the number of heroin users in importing countries.[4] Both variables serve as a proxy for the economic-driven behaviour of traffickers. Whereas the former looks at higher return per unit sold, the latter tests whether countries with a higher demand tend to import heroin from a higher number of trading partners.

The model also includes two matrices of spatial proximity for the purposes of testing how geographical distance influences illicit trafficking. The first matrix measures the distance between two countries, whilst taking into consideration the actual distribution of the population within the respective nations (Mayer & Zignago, 2011).[5] The second matrix controls for countries which share a common border, a condition that might provide traffickers with lower risk when attempting to move drugs across land rather than by air or sea, which are usually subject to higher controls (Reuter, 2014, p. 34).

Finally, three relational variables are used to test to what extent social proximity facilitates drug trafficking between any two given countries. Several studies in macroeconomics identify migration, common language and past colonial relationships as primary social factors affecting legal trade (Frankel & Rose, 2002; Ghemawat, 2001; Lameli et al., 2013; Lee & Park, 2016; Rauch, 1999; Sgrignoli et al., 2015). Their effect is tested by considering migration flows among the 61 countries included within the analysis, the presence of a language spoken by at least 9% of the population in any pair of countries, as well as historical colonial relationships among countries. Migration data from the United Nations Global Migration Database (UNGMD) reports the number ("stock") of international migrants, for each country, in relation to their country of origin. Data on common language and historical colonial relationships derive from the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII).

Exponential random graph models

Exponential Random Graph Models (ERGMs) are a class of statistical models for networks that allow for the prediction of the probability of tie formation based on a set of covariates (nodal and relational attribute data) and the properties of the network itself (Robins, Pattison, Kalish, & Lusher, 2007). These models formulate the probability of observing a set of connections as:

$$P(Y = y|X) = \exp[(\theta^T g(y, X))]/k(\theta)$$

where Y is the set of edges in a network, y is a particular given set of edges, X represents a matrix of attributes for the vertices in the network, $g(y, X)$ a vector of network statistics, θ corresponds to the vector of coefficients, and $k(\theta)$ a normalising constant (Goodreau, Handcock, Hunter, Butts, & Morris, 2008). Both dyad independence models and dyad dependence models—i.e., those controlling for higher order interdependencies between countries— are estimated (Robins et al., 2007).

Most statistical models assume that all observations are conditionally independent. Yet, "when modelling international trade the assumption of conditional independence is difficult to sustain even in the presence of directed country or dyad fixed effects" (Ward, Ahlquist, &

Rozenas, 2013, p. 96). ERGMs enable researchers to take into account interdependencies among observations, including higher-order dependencies, i.e., reciprocity, transitivity, balance and clusterability (Wasserman & Faust, 1994). To cite an example, transitivity encapsulates the logic that the “friend of a friend is a friend”. Henceforth, if country *i* trades with country *j*, and country *j* trades with country *k*, then the probability of a flow of goods between *i* and *k* is greater than that between *i* and a fourth country that has no prior or pre-existing trade relationship.

ERGMs take into account dependencies among observations by including parameters for endogenous structural effects, such as reciprocity, transitivity, and the distribution of incoming and outgoing ties in the trafficking network. A parameter for mutual dyads (MUTUALS) captures the probability of reciprocal ties between any two given countries. Two terms are added to account for transitivity in the network: geometrically weighted dyadwise shared partners (GWDSP) and geometrically weighted edgewise shared partners (GWESP). They represent two-paths and transitive triads, respectively. Geometrically weighted in-degree (GWIDEGREE) and out-degree (GWODEGREE) are included in order to capture the skewed distribution of ties among countries. These parameters aid us in our attempt to capture processes influenced by the characteristics of the network, and, in turn, limit the problem of model degeneracy (Hunter, 2007; Hunter & Handcock, 2006).

The study adopts an iterative development model to identify the combination of variables that best fit the data (Goodreau, Kitts, & Morris, 2009; Papachristos, Hureau, & Braga, 2013). The suitability of the models is assessed through comparing the Akaike Information Criterion (AIC), and by performing goodness-of-fit checks outlined in the work of Hunter, Goodreau and Handcock (2008). The analyses are performed using the Statnet suite of packages (Handcock et al., 2016; 2008) for R (R Core Team, 2016).

Limits

This study begins to construct the heroin trafficking network by utilising information from the UNODC IDS dataset. However, it is important to note that UN member states only submit information about relevant seizure cases on a voluntary basis (Boivin, 2014c). Consequently, some countries may not report information, resulting in a lack of particular connections in the network (Boivin, 2011). By using data spanning across several years (2007-2012) and by focusing specifically on European countries, which tend to provide more information than non-European ones, we hope to reduce the risk of omitting significant links. Having said this, the network can only ever be partial and incomplete, lacking in both minor connections and important ones. Most notably, the network neglects the pivotal role of Russia as a transhipment point to Central Europe, due to the paucity of information provided by Russia and its neighbouring countries (i.e., Belarus, Ukraine, and Estonia).

Other potential biases derive from misunderstandings during the compilation of the IDS by UN member states. Specifically, there is an observed tendency for officers to sometimes indicate the last country for which they can track the shipment, which, of course, can be different from the last country from which the heroin actually flowed (Boivin, 2011). That said, a careful check of the information of each seizure case may add to the meaningfulness of the analysis, but it does not guarantee the reliability of the original information.

The network under analysis also considers if two countries export/import heroin from each other, but it does not take into account the amount of drug which is traded, thus ignoring a critical element of the complexity of drug trafficking. However, this modelling of the network reduces the potential bias stemming from the non-uniformity of reporting on significant seizures. Indeed, including quantities may upwardly inflate the role of exporter for countries with a higher interception rate. The only way in which this bias would affect this analysis is if some countries tend to enforce more along certain borders than others.[6]

The operationalization of the independent variables also raises several concerns. Firstly, the rate of police officials may not serve as an appropriate proxy for the level of enforcement against the supply of drugs. That is to say, police officials are employed for manifold duties besides enforcing the supply of illicit drugs, not to mention that higher numbers of police officials does not necessarily equate to better policing performance. However, we wish to note that several other studies have used this variable to estimate the risk of interception given the lack of better proxies at a cross-national level (Boivin, 2014a; Keefer et al., 2008; Soares, 2004). Similarly, seizure rate is not a straightforward indicator of the level of interdiction, as seizures are an outcome of several factors including quantity of drug supplied, interdiction and the care taken by traffickers (Kilmer et al., 2015; Kilmer & Hoorens, 2010; MacCoun & Reuter, 2001). Disentangling the effects of these complex factors is at this present moment simply not possible. The introduction of the law and order index, which aims to measure the capability of institutions to monitor illicit activities, represents one such concerted attempt to corroborate the results about the effect of law enforcement on international drug trafficking. However, as with the aforesaid variables, the law and order index does not specifically assess enforcement against the supply of illicit drugs, but, rather, the institution's overall performance.

The illegality of the heroin market makes it incredibly difficult to collect reliable data on the number of users and pricing (Reuter & Greenfield, 2001). Such data collection issues are exacerbated yet further when extended to cross-country analysis, as estimates may reflect both differences across countries as well as countries' idiosyncratic data collection methods. Such factors introduce cross-country comparability issues and, ultimately, affect the analysis (Kilmer et al., 2015). With respect to the number of heroin consumers, the adoption of the total number of estimated users reduces the bias introduced by different estimate methods of the drugs prevalence. Kilmer et al. (2015) and UNODC (2015c) provide detailed discussions about the limits and potential biases caused by the use of such data.

Results and discussion

The trafficking network is composed of 61 nodes (countries) and 187 edges or links that correspond to 5% of all possible edges (a density equal to 0.05).[7] Table 3 reports some descriptive statistics of the heroin trafficking network from, to, and within Europe. As in previous studies (Boivin, 2013, 2014a), the heroin trafficking network shows a relatively low density, i.e. traffickers concentrate on traversing a limited range of specific routes. On average, each country imports heroin from three other countries (i.e., in-degree) and has trading relations with six other countries in the network.

TABLE 3 AND FIGURE 1 ABOUT HERE

The two graphs in Figure 2 show the distribution of incoming (i.e., imports) and outgoing (i.e., exports) ties. In-degree and out-degree scores are not equally distributed among the nodes, and the network is more centralised in terms of out-degree rather than in-degree centrality; a small number of countries export to a plethora of other countries, whilst the majority have only one or a few trading partners to export to. This suggests that some countries have a hub role within international heroin trafficking, whereas others are only involved in it as transit countries due to their geographic location along major trafficking routes. Pakistan (out-degree=26), Turkey (22) and Bulgaria (15) are the countries with the largest number of outgoing ties. This is due to their relative proximity to Afghanistan, which is the largest opium producer in the world and the point of origin for the vast majority of illicit opiates flowing to Europe (UNODC, 2015c, 2016).

Some researchers report the involvement of African countries in the export of heroin from Asia to North America (Ellis, 2009; UNODC, 2010), and more recently to Europe (UNODC, 2015a). Large seizures have been recorded only between Nigeria and France, and between Kenya and Switzerland, which would suggest that African countries have not attracted substantial heroin trafficking in the period of 2007-2012.

Seizure cases show only residual levels of heroin flow from American countries to Europe. The sole links identified in this path connect Bolivia with Ecuador and Spain. Heroin flows from Europe to the Americas are also scarce and targeted mainly at Canada. This confirms findings from previous studies that there is a degree of separation between the European and the American markets (Ciccarone, 2009; UNODC, 2015d). Mexico, Colombia, and Guatemala have jointly provided the majority of heroin targeted at the large US market, as well as other minor markets in the region (Ciccarone, 2009; Astorga & Shirk, 2010; UNODC, 2015d; ONDCP, 2016).

The number of incoming ties is more homogeneous among the countries included in this network (in-degree centralisation=0.185). Generally, countries import heroin from either one or, at most, a few trade partners. However, differences among countries exist which confirm important asymmetries in their role within the heroin market (UNODC, 2014b). Countries at the end of the supply chain have much higher in-degree scores (i.e., number of incoming ties). These include Spain (in-degree=14), Austria (10), Germany, and Denmark (8), which both confirms their role as importers and the necessity of satisfying their internal demand.

FIGURE 2 ABOUT HERE

Statistics pertaining to the flow betweenness centralisation support the validity of the strategy used to model the international heroin network. Flow betweenness centrality accounts for all of the times a node is located on a path between any two other nodes (Borgatti, 2005), and it identifies the countries favouring opiate flows, i.e. transit countries. As reported in Table 3, flow betweenness centralisation is relatively low, which indicates that some countries do indeed have a hub position, but this role is shared by various countries rather than being centralised. Countries with the highest flow betweenness scores include Germany, the Netherlands and Turkey. Turkey is the natural geographical connection point between Western Asia and Europe. Most of the heroin shipments move through Turkey before splitting off into the three alternative branches which constitute the Balkan route (i.e., Northern, Southern and Western branches) (UNODC, 2014b). Several reports have also highlighted the relevance of the Netherlands as a redistribution centre for the heroin arriving from the Balkan route and the cocaine from South America, due, in part, to its densely trafficked ports and airports (Farrell, 1998; Lahaie, Janssen, & Cadet-Taïrou, 2016; Savona & Riccardi, 2015; UNODC, 2014b). Germany is located in the middle of Europe and hosts a large Turkish migrant community that is primarily involved in the import of heroin to Europe from South East Europe (Paoli & Reuter, 2008).

Table 4 reports the odds ratio for the ERGMs of the heroin trafficking network.[8] Model 1 is the baseline model and shows the probability of forming a tie that, without the introduction of any predictors, is equal to the network density (5%).[9]

Model 2 includes the independent and control variables within the ERGMs. The results show that geographic proximity is a crucial factor influencing heroin trade among countries. Countries who share a border are 3.4 times more likely to trade heroin with each other. In contrast, the weighted geographic distance is not significantly associated with heroin flows among countries. What this suggests is that heroin shipments tend to move along land routes, as opposed to air or sea. This is due to the fact that, although ships and aircrafts cover longer distances and bypass transhipment countries, they are also subject to stricter controls. Heroin trafficking appears to systematically cross several countries before reaching consumer markets, increasing the time necessary to move the load to destination and, in turn, reducing profits, but, importantly, keeping the level of sophistication of the shipments low and reducing the risk of interception and arrest for traffickers. Further research should investigate how these results might change when land routes are not a feasible option, as in the case of cocaine flows to Europe, or when the value per volume is lower, as in the case of Chinese counterfeit cigarettes or resin cannabis from Morocco.

The results show that both migration flows and common language have an effect on the way heroin moves between countries, whereas prior colonial relationships appear to not be significantly associated with it. As is the case with legal trade, paired countries with intense migration flows are also more likely to traffic heroin with each other. This confirms findings from previous studies on the influence of migration patterns on drug trafficking routes (Akyeampong, 2005; Paoli & Reuter, 2008; Zaitch, 2002). For instance, Paoli and Reuter (2008) found that Turkish and Albanian ethnic groups dominate the import and retail distribution of heroin in Europe. Despite their predominance, these groups do not act as a monolithic bloc, but, rather, cooperate or compete with other ethnic groups to smuggle heroin into Europe. Criminal groups involved in transnational drug trafficking tend to organise their activities along a continuum with large, long-lasting and well organised groups at one extreme, and small, temporary networks of collaborating criminals at the other (von Lampe, 2013; Ruggiero & Khan, 2007; Kostakos & Antonopoulos, 2010).

Furthermore, countries where sections of the population speak the same language are 1.9 times more likely to traffic heroin. Egger and Lassmann (2012) showed how speaking the same language increases trade flows between two countries by 44%. Common language serves as a proxy for a form of cultural contiguity between particular countries. Several studies document how common or similar cultural arrangements make agreements between trading partners easier (Frankel & Rose, 2002; Lameli et al., 2013). For example, transaction costs are lower if partners share the same cultural or religious background (Combes, Lafourcade, & Mayer, 2005). This is as valid for drug trafficking as it is for legal trade. Above all, cultural proximity provides traffickers with the opportunity to rely on non-economic factors to find international partners (e.g., reputation and trust of suppliers, belonging to the same ethnic group). This reduces uncertainties in a market that operates “both without and against the state” (Paoli, 2002, p. 64), i.e. a market whose participants cannot resort to legal authorities to enforce their agreements, and are constantly under threat of arrest.

The inclusion of migration flows and language may go some way to explaining why the colony-colonizer relationship does not significantly affect the heroin network. According to previous analyses, ethnicity and migration patterns are crucial determinants of the international flows of both illicit and licit goods (Paoli & Reuter, 2008; Rauch & Trindade, 2002). Language and migration flows can capture the effect of culture and ethnicity, and, from an econometric perspective, mitigate the role of past colonial relationships in the formation of trading connections. Lameli et al. (2013) examine various aspects of linguistic influences on trade, concluding that the principal effect from speaking the same language is the promotion of cultural proximity among partners. Migration patterns often overlap with colonial relationships. For instance, half of the Colombians who migrated to Europe reside in Spain. Consequently, migration flows may account for the movement of people from former colonies to colonizer countries, in turn, limiting the effect of colonial relationships in the model.

Market forces also seem to affect, in part, the heroin trafficking network. That is to say, countries with a high demand tend to import heroin from a larger number of countries, while the maximization of profits (operationalized in terms of trade price mark-ups) does not seem to affect the formation of a trafficking route. The number of heroin users is significantly and positively correlated with the probability of forming a tie. For example, the largest Western and Central European markets (i.e. UK, France, Italy and Germany), which constitute the bulk of European heroin consumption, import from a higher number of countries than most other countries within the network.[10] Large markets provide more business opportunities, which, in turn, attracts more traffickers and drug flows from different trading partners. An alternative explanation is that greater availability of heroin in countries along important trafficking routes facilitate its distribution and consumption among the local population (Beyrer et al., 2000; UNDCP, 1998).

The methodology utilised here does not allow us to definitively identify the direction of the causality, and therefore we must stress that both dynamics may coexist.

The literature is unanimous concerning the fact that economic profits are the primary driving force of drug trafficking (Arlacchi & Lewis, 1990; Chi, Hayatdavoudi, Kruszona, & Rowe, 2013; Desroches, 2007; Kenney, 2007). However, the results of the current study indicate that gross profits only partially affect the structure of the heroin trafficking network. In fact, the influence of indicators of social proximity is stronger in this case, thus demonstrating how social and cultural relations are more relevant predictors of the formation of heroin trafficking routes than market-driven reasons (i.e., profits) (Kleemans, 2013). Nonetheless, better connections, faster transactions, and lower risk of detection and scams have an economic value that traffickers are likely to take into account when organising their businesses.

Corruption is positively and significantly associated with the number of incoming ties; the higher the level of corruption, the higher the number of connections through which heroin enters the country. For each one-unit increase in the level of corruption in the importing country, the likelihood of forming a link increases by 1.1 times, when everything else is held constant. Corruption reduces risks and non-monetary costs, hence providing traffickers with protection against arrests and seizures (Basu, 2014). Consequently, it can perhaps be thought of as providing a similar function for the black market that the enforceability of contracts does for legal commerce. In the same way that strong institutions protect legal and property rights and, in turn, facilitate legal trade, so corrupted officials guarantee the traffickers impunity and success in shipping drug loads.

Previous literature underlines that corruption can increase as a consequence of increased drug flows (Boyum & Kleiman, 2001; Chalk, 2011; Corso, Mercy, Simon, Finkelstein, & Miller, 2007; Giraldo, 1999; Guizado, 2005; Moser, Lister, McIlwaine, Shrader, & Tornqvist, 1999; Singer, 2008; Thoumi, 2002). The use of a general corruption index, which does not focus on drug-related bribes, suggests that corruption has a stronger impact on connections rather than the other way round.

From a drug policy perspective, the main finding of the study is that the tightness of law enforcement actions (police forces and seizures) in a country is ineffective in discouraging the formation of a trafficking connection. The robustness of the results is supported in model 3 by introducing the Crime and Order Index from the *International Country Risk Guide* (The PRS Group, Inc., 2015). The only difference between model 2 and 3 centres on the influence of seizure rates in importing countries. In model 2, seizure rate coefficients are positive and significant, i.e. more seizures are associated with a larger number of connections in the trafficking network. Countries exposed to larger flows of heroin are, in turn, expected to dedicate greater attention to fighting the traffic. Therefore, the positive correlation between seizure rates and the presence of heroin flows might be due to the historical evolution of drug trafficking and its enforcement in the countries within the network.

Models 2 and 3 suggest that enforcement does not prevent the formation of drug trafficking flows. Reuter and Kleiman's (1986) "risks and prices" model, used in several drug policy analyses, assumes that the risk of arrest and incarceration is the main cost for supplying illicit drugs . However, empirical studies show little evidence that additional enforcement might affect the supply of illicit drugs (Pollack & Reuter, 2014).

As Paoli and colleagues point out, the international supply of opiates cannot be cut, and, moreover, supply-oriented policies have a limited influence (2009). Besides having a low probability of success, a supply-reduction approach and the imposition of criminal laws for drug-related crimes in general may worsen the situation by fuelling corruption and violence, and incurring other economic, political and social costs (Calderón, Robles, Díaz-Cayeros, & Magaloni, 2015; Eck & Maguire, 2000; Freeman, 2006; Greenfield & Paoli, 2012; Kleiman, 2011; Kleiman, Caulkins, Hawken, & Kilmer, 2012; MacCoun & Reuter, 2001; Miron, 1999; Osorio, 2015; Paoli et al., 2009; Riley, 1998; Rios, 2013). Despite these side effects, law enforcement actions form the cornerstone of anti-drug policies in most countries (Caulkins & Reuter, 2010; Collins, 2014; Mejía & Restrepo, 2014; Werb et al., 2011). This does not mean that a supply-side intervention should not be used, but simply that a more harm-reduction oriented approach, aiming at limiting its side effects, may be more impactful and have longer-term effects

(Greenfield & Paoli, 2012). The results of this study, in particular, suggest that policies centred on tackling heroin trafficking in specific regions should primarily focus on neighbouring production countries and countries with a hub position (i.e. those with several trading partners and/or those facilitating drug trade among other countries in the network).

Finally, the model includes parameters that account for the structure of the network. The parameter for mutual dyads shows that there is a 5% probability of reciprocal ties between any two given countries, indicating that heroin shipments do not tend to move back and forth between countries but rather flow in one direction—from producer to consumer countries. GWIDEGREE and GWODEGREE capture the skewed distribution of incoming and outgoing ties among the countries, respectively. The latter shows that the probability of forming a new outgoing tie decreases as the number of a country's already existing outgoing links increases. In contrast, GWDSP and GWESP account for the transitivity in the network by capturing two-paths and transitive triads. The former is negative and statistically significant, indicating that the probability of two countries exchanging heroin via a third country decreases as the number of intermediaries already in use increases. The latter is positive and statistically significant, indicating that the probability of forming a tie increases when the added edge increases the transitivity in the network. What these findings indicate, above all, is that the overall result of drug trafficking disruption interventions may vary depending on a country's role in the network. Tightening controls along connections that have alternatives are unlikely to have meaningful side effects for third countries, whereas, targeting countries that increase the transitivity in the network may, on the contrary, result in the reduction of heroin flows within other markets.

Most of the relationships investigated above could also, to some extent, be explained in reverse. Some of the findings shed light on the association between key variables, but they remain an inadequate ground for stronger causal inferences. While the characteristics of the national markets and of drug countermeasures influence the structure of the supply, the latter, in turn, is likely to modify the market and to shape countering policies. These reverse effects are going to be stronger whenever the phenomenon endures over time, as it does in most heroin markets. A country afflicted by pervasive corruption, as aforesaid, would tend to attract a higher number of heroin flows. However, at the same time, massive drug shipments may lead to increased levels of corruption. Ceteris paribus, the same logic applies to the rate of police officers. The lower the level of law enforcement, the higher the likelihood of drug flows to a country; yet countries exposed to significant flows of drugs might react with an increase in the number of police officers assigned to drug units, thus making the phenomenon more complex to interpret. Future studies should include longitudinal analyses to test how robust the results are to different specifications.

TABLE 4 ABOUT HERE

Conclusions

This study confirms that both drug trafficking clusters along specific routes and its structure are not random, but, in actual fact, driven by specific factors. Specifically, risks, profits, and geographic and social proximity affect the configuration of heroin supplied to European countries.

The study proves that there is a strong overlap between the determinants of legal and illegal trade. Geographic and social proximity affect drug trafficking in much the same way that they affect licit trade flows. Geographic distance increases the risk of interception, as well as transportation and communication costs. Hence, two countries sharing a border are more likely to trade in heroin, because the imminent proximity reduces both the level of organization needed to ship the drug and the complexity of trafficking in general. Social proximity is also an essential driver of the structure of international trafficking routes. Several studies have identified drug trafficking as an inefficient business, due, in part, to working without the protection of any legal authority and the risk of arrest (Paoli, 2002; Reuter, 1985). Hence, social proximity is a valuable resource for finding business counterparts, procuring access to strategic information, and in terms of settling disputes and reducing uncertainties.

This article offers several key insights for law-enforcement authorities and policy-makers. Interdiction programs have accounted for a large share of drug control expenditure in recent years (Babor et al., 2010; EMCDDA, 2008). Indeed, even countries with lenient regulations for the drug market—i.e., the Netherlands—invest most of their budgets in tackling the supply of illicit drugs (Rigter, 2006). It is our contention that the stated priority of the EU Drugs Strategy

(2013-2020) to disrupt the international supply of illicit drugs would be better achieved by employing strategies aimed at reducing corruption and consumer demand for heroin, rather than focusing on stricter enforcement of the supply. Increasing resilience against corruption would reduce the porousness of borders and prevent countries from becoming a part of main trafficking routes. At the same time, it would also help to decrease the costs stemming from the militarization of borders and the war on drugs (i.e., reduction in trade efficiency, violence and mass-incarceration). Similarly, demand control programs trying to cut heroin consumption by reducing the number of users and/or the quantity of the drug which they consume—such as via opioid substitution therapies—may discourage the formation of drug trafficking routes.

These recommendations do not imply that supply-side interventions should simply be abandoned; rather, we are proposing that the authorities should take a more problem-oriented approach as opposed to randomly distributing resources. Law enforcement authorities should focus their interdiction programs on specific connections: those identified in the network and those that, according to the parameters identified here (i.e., geographic proximity, common language and migration pattern), are more likely to become trafficking routes. As for hot-spot policing, drug enforcement should concentrate on the same areas where drug trafficking occurs.

Moreover, the findings of this study can also help to develop risk assessment models, which aid our ability to predict the balloon effect. As the literature demonstrates, if authorities clamp down against specific connections, then traffickers simply displace to alternative routes. Interdiction in one country can have direct consequences for another; hence, policymakers who are planning a major crackdown should consider the potential effects of doing so on other countries. The parameters identified in this study can be used to predict where traffickers are more likely to displace to. This would help to prevent or, at the very least, reduce the balloon effect and, more importantly, strengthen the effect of the crackdown on illicit drug trafficking flows.

This study represents the first empirical attempt to understand which factors explain the formation of drug trafficking routes. Although, as demonstrated, it already provides expedient insights and recommendations, further work is required in order to aid law enforcement and border guards working on the ground. In particular, future research should focus on the concentration of drug trafficking at local level and include information about the mode of transportation of drug shipments. This is because evidence suggests that drug trafficking also concentrates at a micro level (Rengert, Chakravorty, Bole, & Hendersen, 2000; Rengert, Ratcliffe, & Chakravorty, 2005). A geospatial network analysis, which combines information on the international drug trafficking network and its geographical concentration at a micro-level, could therefore provide critical information for law enforcement authorities. When paired with information about the means of transportation of drug loads, it may be crucial in terms of developing a problem-oriented approach to disrupt international drug trafficking.

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[1] Table A1 in the Appendix lists the 61 countries that form the heroin trafficking network under analysis. Countries are labeled as European according to the macro geographic regions used by the United Nations (UNODC, 2015b)

[2] The 10,378 dyads often involve the same two countries. Removing the duplicates, we obtain 325 dyads.

[3] The control of corruption index ranges from -2.5 (weak control) to +2.5 (strong control). The reciprocal of the index is used in the analysis so that higher values indicate higher corruption levels.

[4] The number of users is derived from the prevalence of illicit opiate use times the population of the corresponding age group, usually 15-64. This data is collected from the UNODC and the EMCDDA (EMCDDA, 2015; UNODC, 2014b).

[5] The distance between countries is based on CEPII weighted distance that calculates bilateral distances between the biggest cities of any two countries, and weights inter-city distances by the share of the city in the country's overall population (Mayer & Zignago, 2011).

[6] We considered alternative approaches to aid in the construction of the network. For instance, Chandra and Joba (2015) built a network on the trafficking of heroin among 17 European countries using differences in wholesale prices across countries. However, besides Western and Central Europe, few countries provide systematic data about wholesale prices. Therefore, using wholesale prices data would create problems of collinearity in testing the economic-driven behaviour of traffickers.

[7] In a directed network the number of possible edges equals $N \cdot (N-1)$, where N is the number of nodes (Wasserman & Faust, 1994). In the heroin trafficking network, the number of possible trading relationships is equal to $61 \cdot 60 = 3{,}660$.

[8] Maximum pseudo-likelihood estimation (MPLE) is used for parameter estimation in dyad independence models. For dyad dependence models, the maximum likelihood is approximated using Markov Chain Monte Carlo (MCMC) simulation methods.

[9] The probability of forming a tie is equal to $OR/(1+OR)$.

[10] Russia and, albeit to a lesser extent, Ukraine also have large internal markets for illicit opiates. However, in these countries, a substantial number of opiate users consume compote, a liquid substance obtained from poppy straw. Compote is mostly domestically produced and it is less potent than heroin (Paoli, Greenfield, & Reuter, 2009).

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Figures and tables

Table 1. Example of the IDS dataset structure between 2007 and 2012

Country	Date	Quantity (kg)	Producing country	Departure country	Destination country
United Kingdom	4/22/2011	130	Afghanistan	Pakistan	United Kingdom
Pakistan	10/9/2011	15	Afghanistan	Pakistan	Belgium
…	…	…	…	…	…
Bulgaria	2/19/2010	86		Bulgaria	Netherlands
Spain	8/18/2010	18		Belgium	Spain
…	…	…	…	…	…
Portugal	10/1/2009	23		Netherlands	Portugal
Pakistan	1/17/2009	18	Afghanistan	Pakistan	Nigeria
Pakistan	3/26/2009	8.5	Afghanistan	Pakistan	United Kingdom
Spain	3/29/2007	7	Afghanistan	Turkey	Spain
…	…	…	…	…	…

Source: UNODC

Table 2. Independent variables

Dimension	Variable	Source	Period	Type*
Risk of enforcement	Police agents, rate per 100,000 population	UNODC	2009-2012 (avg.)	N
	Seizures, rate on 100,000 population	Authors' elaboration on UNODC data		
	Control of corruption	World Bank		
	Law and order index	International Country Risk Guide	2009	N
Profits	Wholesale price mark-ups	Authors' elaboration on UNODC data	2009-2012 (avg.)	R
	Users	UNODC	2009-2012	N
Geographic distance	Border adjacency	CEPII	NA	R
	Weighted distance	CEPII	NA	R
Social distance	Migrants	UNGMD	2010	R
	Language spoken by at least 9% of the population	CEPII	2000-2008	R
	Colonial relationship	CEPII	NA	R

Source: authors' elaboration

*R = relational attribute data; N = nodal attribute data

Table 3. Network statistics

Measures	Statistics
Size	61
Edge count	187
Density	0.051
Mean degree	6.131
Mean in-degree	3.066
In-degree centralization	0.185
Out-degree centralization	0.389
Flow betweenness centralization	0.161

Figure 1. The heroin trafficking network to Europe

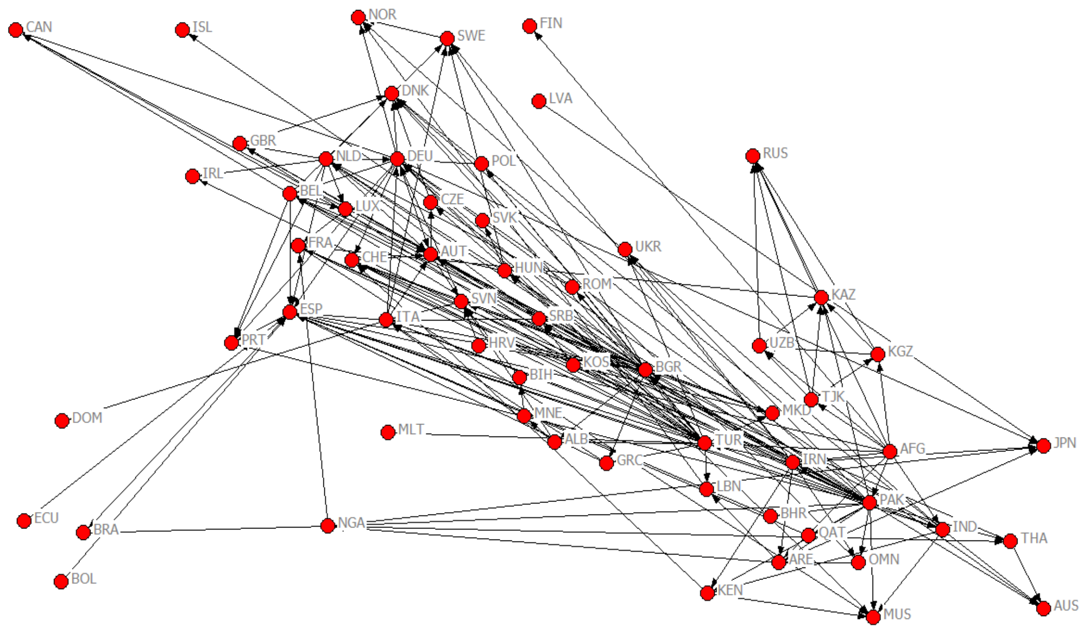

Figure 2. In-degree and out-degree distribution of the heroin trafficking network

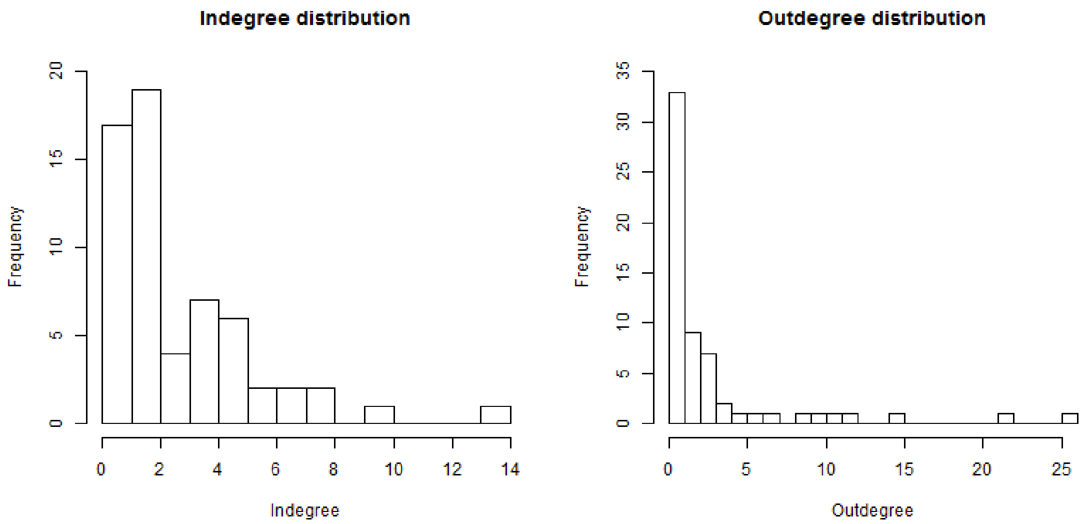

Table 4. Odds ratio (OR), 95% confidence intervals (CI), and standard errors (SE) from ERGMs of the heroin trade network

	Model 1			Model 2			Model 3		
	OR (CI)		SE	OR (CI)		SE	OR (CI)		SE
Edge statistic	0.054	***	0.075	0.005	***	0.577	0.005	***	0.602
	(0.046-0.062)			(0.002-0.017)			(0.002-0.018)		
Police agents				1.000		0.000			
				(1.000-1.001)					
Law and Order index							1.049		0.056
							(0.940-1.171)		
Seizure rate				0.115	***	0.049	0.097		1.300
				(0.105-0.127)			(0.008-1.244)		
Corruption				1.113	*	0.051	1.115	*	0.052
				(1.007-1.231)			(1.007-1.234)		
(log) Heroin users				1.096	*	0.040	1.094	*	0.041
				(1.014-1.186)			(1.010-1.185)		
Trade price mark-ups				1.000		0.000	1.000		0.000
				(1.000-1.000)			(1.000-1.000)		
Border adjacency				3.442	***	0.257	3.489	***	0.257
				(2.078-5.700)			(2.108-5.776)		
(log) Weighted distance				1.003		0.030	0.998		0.029
				(0.946-1.064)			(0.943-1.057)		
(log) Migrants				1.180	***	0.023	1.172	***	0.024
				(1.128-1.234)			(1.118-1.229)		
Common language				1.908	**	0.218	1.907	**	0.217
				(1.246-2.923)			(1.245-2.919)		
Colony				1.329		0.375	1.367		0.380
				(0.637-2.771)			(0.649-2.876)		
Mutual				0.060	***	0.726	0.062	***	0.718
				(0.014-0.249)			(0.015-0.251)		
GWODEGREE				0.280	***	0.353	0.277	***	0.355
				(0.140-0.559)			(0.138-0.556)		
GWIDEGREE				6.242	***	0.509	7.273	**	0.574
				(2.302-16.93)			(2.361-22.41)		
GWDSP				0.814	***	0.033	0.815	***	0.033
				(0.763-0.868)			(0.764-0.870)		
GWESP				3.534	***	0.145	3.548	***	0.145
				(2.659-4.697)			(2.668-4.718)		
AIC	1479			1101			1101		

*** p < .001; ** p < .01; * p < .05.

Appendix

Table A1. Countries of the heroin trade network

Country	Country code	Country	Country code
Afghanistan	AFG	Kazakhstan	KAZ
Albania	ALB	Kenya	KEN
United Arab Emirates	ARE	Kyrgyzstan	KGZ
Australia	AUS	Kosovo under UNSCR 1244	KOS
Austria	AUT	Lebanon	LBN
Belgium	BEL	Luxembourg	LUX
Bulgaria	BGR	Latvia	LVA
Bahrain	BHR	Macedonia (TFYR)	MKD
Bosnia and Herzegovina	BIH	Malta	MLT
Bolivia (Plurinational State of)	BOL	Montenegro	MNE
Brazil	BRA	Mauritius	MUS
Canada	CAN	Nigeria	NGA
Switzerland	CHE	Netherlands	NLD
Czech Republic	CZE	Norway	NOR
Germany	DEU	Oman	OMN
Denmark	DNK	Pakistan	PAK
Dominican Republic	DOM	Poland	POL
Ecuador	ECU	Portugal	PRT
Spain	ESP	Qatar	QAT
Finland	FIN	Romania	ROM
France	FRA	Russian Federation	RUS
United Kingdom	GBR	Serbia	SRB
Greece	GRC	Slovakia	SVK
Croatia	HRV	Slovenia	SVN
Hungary	HUN	Sweden	SWE
India	IND	Thailand	THA
Ireland	IRL	Tajikistan	TJK
Iran (Islamic Republic of)	IRN	Turkey	TUR
Iceland	ISL	Ukraine	UKR
Italy	ITA	Uzbekistan	UZB
Japan	JPN		