

Drug trafficking networks in the world-economy

Rémi Boivin

Transnational drug trafficking involves the movement of illegal commodities across borders. In most cases, willing sellers and buyers collaborate to successfully achieve their goal. In the last twenty-five years, researchers demonstrated that drug trade networks share a lot in common with legal markets. Naylor (2003) proposed a definition of market-based offenses that is useful to understand transnational drug trafficking. He stated that drug trafficking consists of multilateral exchanges of inherently illegal goods between producers, distributors and consumers in a market-like context. Two elements of Naylor's definition are particularly relevant. First, drug trafficking involves the movement of an illegal commodity from source to user. The chain between the two comprises a given number of intermediaries. This could be referred to as the "economic" element because it is centered on the commodity trade. Second, those exchanges occur in specific social and political contexts; the commodity itself is secondary. The contextual element of drug trafficking has been the subject of many analyses in geopolitics. The study of transnational drug trafficking thus remains multidisciplinary and quite divided: it combines notions borrowed from sociology, anthropology, economics and politics.

Economic analyses of transnational trafficking demonstrated the fundamental inequality among participants of the trade. Peter Reuter and his colleagues demonstrated that production costs were negligible compared to the retail price of cocaine in the US (Caulkins & Reuter, 1998; 2010; Reuter & Kleiman, 1986). Most capital gain comes from risk compensation at importation (Reuter & Greenfield, 2001) and at retail sale (Caulkins & Reuter, 1998; Levitt & Venkatesh, 2000). Profit per person is high for upper and middle level traffickers but most of the accounting profits are divided among a large number of low level dealers. At country-level, those analyses imply 1) that crop destruction strategies aiming to raise prices in destination countries are doomed from the start and 2) that transnational drug trafficking involves the transfer of money to source and transit countries.

Which countries benefit from the drug trade? Geopolitics are useful to explain the historical role played by Afghanistan in the production of opium poppy (Chouvy, 2010), the frequent use of Spain as a transit country towards Europe (Sands, 2007) or the development of the cocaine industry in Colombia (Kenney, 2007; Thoumi, 1995). In all cases, drug trafficking emerged and remained in place because of a combination of economic, geographic, cultural and political factors. An interesting feature is that countries that benefit from the drug trade rarely occupy key positions in the global economy.

In a separate paper (Boivin, 2010), I argued that the world-system perspective offers a theoretical framework that allows a global-level analysis of drug trafficking. It was based on two insights common to both geopolitical and economic analyses of drug trafficking. First, drug trafficking is formed of commodity chains, i.e. "network[s] of labor and production processes whose end result is a finished commodity" (Hopkins & Wallerstein,

1982, 59). As a consequence, most empirical work on world-systems uses relational data and network analysis techniques (Chase-Dunn & Grimes, 1995; Kick & Davis, 2001; Kim & Shin, 2002; Mahutga, 2006; Nemeth & Smith, 1985; Smith & White, 1992; Snyder & Kick, 1979). Evidence suggests that drug trafficking requires a structure of criminal opportunities, no matter how formal or informal it is. Second, countries involved in the drug trade become interdependent. A limited number of “hybrid” studies illustrate this point (Farrell, Mansur & Tullis, 1996; Paoli, Greenfield & Reuter, 2009; Reuter & Kleiman, 1986). For example, Paoli et al. (2009) analyzed the world heroin market and showed, among other things, that variations in one part of the market could have significant impacts on the global market. Such studies illustrate the strengths and limitations of current research on transnational drug trafficking. Economic analyses showed that a considerable number of individuals and countries benefit from the trade of illegal drugs. Geopolitics reminded us that the trade was made possible because specific conditions prevail. Both perspectives need to be combined to fully understand the structure of drug trafficking networks.

This paper offers a test of the three main propositions of the world-system perspective applied to transnational drug trafficking. It is based on a largely unexploited dataset of drug seizures collected by the United Nations Office on Drugs and Crime (UNODC). It compares legitimate trades to cocaine, heroin and marijuana markets. Tentative results support the main hypotheses of the world-system framework and suggest that transnational drug trafficking forms markets turned upside down.

Method

The dataset

Two types of relational data were used to build separate networks of exchanges of cocaine, heroin and marijuana between countries. The first is a collection of seizures of “significant” quantities of drugs between 1998 and 2007¹. The dataset provides detailed information on a large number of cases, including origin and/or destination countries (n = 20 527 dyads). Seizures are reported to the UNODC on a voluntary basis; as a consequence, key players of the drug trade are not included in the UNODC dataset. The networks were completed with observational data reported by various international organizations involved in drug trafficking surveillance or control². Overall, the networks cover most countries of the world (n = 194). More details on the construction of the drug trafficking networks are available elsewhere (Boivin, 2011).

¹ The defined threshold of significant quantities used by UNODC are as follows : 1 kilogram or more for marijuana and 100 grams or more for cocaine and heroin.

² I conducted a systematic review of information contained in 48 annual reports and country overviews published by the UNODC, the *Bureau of International Narcotics and Law Enforcement Affairs* (BINLEA), the *International Narcotics Control Board* (INCB) and the *European Monitoring Center for Drugs and Drug Addiction* (EMCDDA).

Global drug trades are compared to legitimate markets. The UN collects detailed country-level commodity trade statistics. COMTRADE identifies the annual value of imports and exports between countries and areas for different types of commodities. Import data for 2000 are used because they have traditionally been considered more reliable than export data (Linneman, 1966). Total values were dichotomized (1 = presence of trade).

Analysis

Network analysis techniques are particularly useful when dealing with relational data. As Morselli (2009) puts it, “the network is a self-organizing structure that is essentially driven by emergent behaviour of its part” (p.11). Network analysis seeks structure without assuming that participants are fully aware of their position. Network analysis is well adapted to empirical tests of the world-system perspective and has been used in major contributions (Mahutga, 2006; Smith & White, 1992; Snyder & Kick, 1979). This paper provides the first attempt to analyze global transnational drug trafficking networks³.

This paper offers a descriptive test of the world-system perspective. The first step was to determine the position of every country in the legitimate world-economy. Following Mahutga (2006), it was indicated by the total value of trade for a given country (more trade = closer to the core). Four groups of countries were formed: core, strong semi-periphery, weak semi-periphery and periphery.

Results

This section is organized around the three main propositions of the world-system perspective (Chase-Dunn, 1989; 2002; Wallerstein, 1974; 1979). The propositions provide a simplification of the framework but capture its core features (Boivin, 2010).

Some processes can only be understood and analyzed at the world-system level

The world-system perspective relies on the assumption that there is a large social system –called the world-system- that comprises borders, structures, member groups, rules of legitimation and coherence. This system stretches over national borders (Wallerstein, 1974). Constituting members (usually countries or states) form a global trade network “built” on political and economical agreements (Chase-Dunn, 1989; 2002; Wallerstein, 1979).

Two types of world-systems have existed: world-empires and world-economies. World-empires consist of a single political system while world-economies have multiple central authorities (Wallerstein, 1974). In theory, many world-systems can co-exist; however, today’s world-economy covers most countries. The boundaries of world-systems are directly related to transport and communication possibilities (Wallerstein, 1974). The

³ The network terminology was used by Paoli et al. (2009) to analyze the world heroin market but the authors did not provide a formal network analysis of the trade.

world-system perspective does not deny the increasing unification of the world's individuals and societies –the globalization of the world: it simply suggests that the process started well before World War II. In other words, world-systems are dynamic in nature, and structural changes have been observed and remain possible (Chase-Dunn, 1989).

Drug markets have distinctive features. The cocaine market is very similar to a world-empire, because it is centered on a single area of production (South America). At the opposite, the marijuana market is an extreme example of a world-economy because it is grown in virtually all countries of the world. As such, the marijuana market has more things in common with present legal trades than cocaine and heroin. However, marijuana trafficking is mostly regional, as Table 1 demonstrates.

Table 1: Proportion of exchanges between countries of the same region or continent

	Cocaine	Heroin	Marijuana
Pairs of countries	418	370	193
Same continent	47,6%	62,4%	72,5%
Same region	32,3%	38,9%	57,5%

It appears necessary to look beyond countries to understand drug trafficking. A single route comprises several countries, and a single country can play different roles in several routes. Furthermore, countries are not connected randomly: the geographical distance between connected countries display important variations from one market to the other. In a world-system perspective, commodity availability and transport opportunities can explain the extent of a market (Wallerstein, 1974). Since marijuana and, to a lesser extent, heroin are available from more than one source, it is not necessary to develop more elaborate and varied means of transport.

The world-system perspective considers specific phenomena as structural consequences of the system. For example, the use of the same trafficking routes for different drugs could be explained by the geographical distance between source and destination countries. The number of options decreases when approaching destination. Thus, poly-trafficking would be a direct consequence of transport opportunities, rather than a carefully planned strategy. In legal markets, using the same route for different commodities is commonplace. Surprisingly few trafficking routes appear to be used for different drugs. Two or three types of drugs appear to be transported on only 132 pairs of countries. The vast majority of pairs (n=694; 84.0%) are solely used for the transport of one type of drugs, which differentiate drug markets from legal trades.

The world is a capitalist system that comprises several regions divided according to a core/periphery hierarchy

Wallerstein and colleagues suggest that the present world-economy is fundamentally capitalist because it fuels on a perpetual search for profit (Wallerstein, 1974). Eventually, the system expands to the point where people are forced to organize production instead of simply buying and selling at the best price (Chase-Dunn, 1989). As stated above, constituting members form a more or less formal trade network that results in the establishment of unequal economic relations, where some countries have more benefits than others. The world-system favours core over peripheral countries and, to a lesser extent, semi-peripheral countries (Chase-Dunn, 1989; Wallerstein, 1974; 1979).

In other words, core countries collect more wealth at the expense of other. Peripheral and semi-peripheral countries are not able to produce necessary specialized commodities and rely on core countries –that sell it at a high price. In return, core countries import raw materials from peripheral countries at low costs. The position in the system is thus a direct function of production means. This structure ensures the stability of the system, even if countries tend to limit their importations and to develop foreign markets in order to improve their position in the system. The primary consequence of the system is that core countries are the sources of most exchanges of legal commodities (Table 2). Peripheral countries are importers in 4.5% of the total commodity trade, and exporters in only 0.3% of exchanges. Peripheral countries are dependent on core countries for their supply in numerous commodities.

Table 2: Exchanges of legal commodities between categories of countries, year 2000 (% of total US\$ value).

	Core	Strong semi-periphery	Weak semi-periphery	Periphery
Core	45.3%	23.0%	5.6%	4.1%
Strong semi-periphery	16.5%	2.7%	0.6%	0.4%
Weak semi-periphery	1.5%	0.1%	0.0%	0.0%
Periphery	0.2%	0.1%	0.0%	0.0%

Source : Mahutga (2006)

Drug markets display similarities but also significant differences. Drug markets are obviously capitalist. When questioned, high-level traffickers invariably mention monetary gain as an important motivation (Decker & Chapman, 2008; Desroches, 2005; 2007). The analysis of drug prices also proved that 1) prices are higher than they would be in a legal market (Miron, 2003) and 2) the gap between legal and illegal prices is largely attributable to risk compensation rather than production/transportation costs (Caulkins & Reuter, 1998). Drug markets differ from legal trade in three important ways.

First, peripheral countries are more involved in the drug trade (Tables 3, 4 and 5). They are the source of more than 40% of exchanges of cocaine, heroin and marijuana, while core countries are exporter in less than 25% of cases. This is a sharp contrast to total legal trade. Second, most exchanges of drugs are between equivalent countries or directed towards core countries (Table 6). Third, core countries depend on peripheral and semi-peripheral countries for their supply in plant-based drugs. The whole production of cocaine and heroin and 82.6% of marijuana exporters are located in peripheral or weak semi-peripheral countries. For various reasons –starting with active drug law enforcement-, core countries are not able to meet the national demand for drugs. Consequently, countries that are generally disadvantaged in commodity trades occupy key positions in drug markets. Capitalist motivations and trade inequality are features of both legal and illegal markets, but the structure appears to be almost opposite.

Table 3: Exchanges of cocaine between categories of countries, year 1998-2007 (% of pairs of countries)

	Core	Strong semi-periphery	Weak semi-periphery	Periphery
Core	13.1%	5.0%	6.2%	1.5%
Strong semi-periphery	3.1%	1.5%	1.5%	1.5%
Weak semi-periphery	12.7%	3.1%	2.7%	7.3%
Periphery	27.0%	5.0%	3.5%	5.0%

Table 4: Exchanges of heroin between categories of countries, year 1998-2007 (% of pairs of countries)

	Core	Strong semi-periphery	Weak semi-periphery	Periphery
Core	10.6%	3.7%	2.4%	0.8%
Strong semi-periphery	4.1%	1.6%	0.4%	0.4%
Weak semi-periphery	13.5%	4.1%	6.1%	8.6%

Periphery	14.3%	4.5%	11.0%	13.9%
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Table 5: Exchanges of marijuana between categories of countries, year 1998-2007 (% of pairs of countries)

	Core	Strong semi-periphery	Weak semi-periphery	Periphery
Core	10.0%	4.4%	3.9%	1.7%
Strong semi-periphery	1.1%	1.1%	0.0%	0.0%
Weak semi-periphery	6.7%	3.9%	3.9%	5.0%
Periphery	15.6%	1.1%	15.0%	26.7%

Table 6: Direction of commodity trade between categories of countries (% of pairs of countries)

	Legal commodities	Cocaine	Heroin	Marijuana
Towards core	18.3%	51.4%	47.3%	39.4%
Same position	48.0%	27.0%	36.7%	45.6%
Towards periphery	33.7%	21.6%	15.9%	15.0%
Total	100%	100%	100%	100%

States play a crucial role in the formation of world-systems

States define rules of circulation at their borders (Wallerstein, 2004). Those rules are applied to commodities, assets and individuals. Consequently, political decisions allow the establishment of the transnational trade network. Laws and economic agreements are adopted to facilitate transnational commodity trade. In the world-economy, the most powerful countries are those that have a large number of diversified relations with other countries (Mahutga, 2006). For example, core countries maintain commercial relations with most countries of the world and thus are not dependent of a small number of trade

partners. Thereby, the density of the world –legal- trade network is high⁴ (De Benedictis & Tajoli, 2009).

Table 7 shows the density of six world trade networks for the year 2000. The density of the world economy was calculated by De Benedictis & Tajoli (2009) and includes all types of legal commodities. Coffee and chocolate data were taken from the UN COMTRADE and include both raw and transformed products.

Table 7: The density of total, chocolate, coffee, cocaine, heroin and marijuana trade networks, year 2000

	Number of countries (n)	Potential links (n*(n-1))	Observed links	Density (%)
Coffee	161	25760	5620	21.8%
Chocolate	162	26082	3834	14.7%
Total (legal)	176	30800	11938	38.8%
Cocaine	118	13806	445	3.2%
Heroin	134	17822	370	2.1%
Marijuana	194	37442	193	0.5%

Just like illegal drugs, coffee and chocolate are addictive plant-based products that require few transformations. What makes comparisons even more interesting is that both products are mainly grown in peripheral countries (Reuter & Greenfield, 2001). However, results suggest again that the structure of the trade is quite different.

Cocaine, heroin and marijuana trade networks are much less dense than coffee and chocolate. In the case of illegal drugs, States decided to ban possession, production and trafficking, but cannot fully enforce drug laws. This situation makes the drug trade different from most trades. Laws are meant to disrupt commercial activities instead of protecting traders. Drug trafficking is a risky business: traffickers can be arrested/convicted, loads can be seized, violence can arise as a way to settle disagreements, etc. Drug routes should probably be analyzed in terms of effectiveness rather than variety. Efficient routes secure drug supply: a drug needs to be available to be purchased. At the opposite, the threat of law enforcement makes it almost necessary to establish more than one route. In short, only one route is needed to secure drug supply, but a variety of routes should make drug markets more resilient (Bouchard, 2007). The density of cocaine and heroin networks is higher close to source countries, due to the

⁴ The density of a network is the number of links in a network, expressed as a proportion of the maximal number of links (De Benedictis & Tajoli, 2009). A network in which all possible links are active has a density of 1.

limited number of possibilities –a typical feature of monopolies. The heroin network is spread-out but less dense than the smaller cocaine network. The marijuana network is not very dense because of the importance of domestic production.

Discussion and conclusion

In theory, the world-system perspective predicts that raw materials would be exchanged at low prices from peripheral countries to core countries. Most legal commodities could be grown or produced in core countries but it is more profitable to import cheap materials. Similarly, cocaine, heroin and marijuana are easy to grow plant-based drugs that require relatively basic transformations. At the same time, law enforcement efforts are more intense in core countries. As a result, core countries are not able to produce enough drugs to meet domestic demand and must rely on less developed countries. In a separate paper, I analyzed drug prices and mark-ups and found that the value of cocaine and heroin increases more sharply when exchanges are directed towards core countries (Boivin, 2011). In other words, core countries depend upon peripheral and semi-peripheral countries to access two popular commodities –cocaine and heroin. The trade network is turned upside-down.

Is drug trafficking a form of payback for countries that are ill-positioned in the world-economy? Caulkins & Reuter (1998) showed that production and transformation costs represent a small proportion of the retail price of drugs and that the value of drugs increases more quickly after importation in destination countries. Consequently, drug trafficking is more profitable for local criminals. Still, transactions after importation involves a redistribution of wealth inside destination countries while transnational trafficking generates money transfers towards foreign criminals –an economic gain for producers and brokers operating in peripheral and semi-peripheral countries (Naylor, 2003).

Also, marijuana networks differ in many aspects. The production of cannabis is widespread –from core to periphery. Most observers explain the expansion of marijuana production in core countries as a convergence of technological innovations (e.g. hydroponics), of a growing tolerance towards consumption and of less active and/or efficient law enforcement efforts (Bouchard, 2007; Bouchard & Dion, 2009; Clements, 2006; Weisheit, 1992). A world-system interpretation of the expansion would be that core countries are trying to limit their dependence on otherwise “dominated” countries. With an important domestic production of a very popular drug, core countries maintain their position in the world-economy, even if the product itself is illegal.

However, protectionism is not enough to explain the domestic production of illegal drugs. The absence of cocaine and heroin production in core countries provides a strong example: producing small quantities of drugs requires very large quantities of coca or opium poppy, which means large-scale outdoor cultivation. While corruption and less intense drug law enforcement allow this kind of cultivation in some peripheral countries, the same situation is inconceivable in core countries.

The world-system approach applied to illegal drug trafficking highlights the fact that drug trafficking involves a series of exchanges between individuals operating in different countries. Macro-level analyses of trafficking should thus be based on relational rather than cross-sectional data (for a similar argument, see Paoli et al. (2009) and Zaitch (2002)). It also supports the idea that drug trafficking is primarily a commercial activity between willing buyers and sellers (Naylor, 2003). Recreational drugs are an attractive market for peripheral countries: core countries are not able to supply the numerous local consumers, a situation usually characteristic of rare or luxury goods (e.g. diamonds). The main difference is that the prohibition of cocaine and heroin creates opportunities for countries that are generally disadvantaged. Drugs are not necessary to ensure the development of societies but they can become a significant political and military issue (Cornell, 2005). Controlling the production and availability of this commodity provides a strategic advantage on other countries.

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