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The Shift to Online Tobacco Trafficking

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Abstract

The illicit trade of tobacco products is a global phenomenon that has impacted the public health, the public finances and the security of nation states. A wide array of actors is involved in the illicit trade of tobacco, ranging from the individuals who bring home a few extra cartons of cigarettes while on a trip to the organized criminal organization of the mafia or terrorist type. The latter appears to be responsible for a very significant part of the illicit tobacco trade. While organized traffickers have traditionally used ports and roads to carry out their activities, a new generation of traffickers has turned to the Internet as a distribution channel for tobacco products. These traffickers are active on online illicit marketplaces known as cryptomarkets. While cryptomarkets have developed expertise in the sale of illicit drugs online, they are at the same time diversifying their activities into many new areas such as financial fraud, identity fraud and tobacco trafficking. The general aim of this paper is to describe and understand the shift to cryptomarkets in tobacco trafficking. Our results demonstrate that tobacco traffickers are involved in polytrafficking and that some do generate important revenues from their online illicit activities.

Keywords: Cryptomarkets, Online illicit markets, Tobacco trafficking.

Introduction

The illicit trade of tobacco products is a global phenomenon that has impacted the public health, the public finances and the security of nation states. A wide array of actors is involved in the illicit trade of tobacco, ranging from the individuals who bring home a few extra cartons of cigarettes while on a trip to the organized criminal organization of the mafia or terrorist type. The latter appears to be responsible for a very significant part of the illicit tobacco trade. While organized traffickers have traditionally used ports and roads to carry out their activities, a new generation of traffickers has turned to the Internet as a

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distribution channel for tobacco products. These traffickers are active on online illicit marketplaces known as *crypto-markets*. Crypto-markets are transactional websites hosted on the dark net, a section of the Internet where connections are encrypted by default and where every effort is made to protect the identity and localization of the participants. Anyone can become a vendor on a crypto-market and put up listings for illicit products and services. Customers can then browse through the listings and select the best vendor for their needs. Crypto-markets now generate sales in the hundreds of millions of dollars US per year.

While crypto-markets have developed expertise in the sale of illicit drugs online, they are at the same time diversifying their activities into many new areas such as financial fraud, identity fraud and tobacco trafficking. The general aim of this paper is to describe and understand the shift to crypto-markets in tobacco trafficking. More specifically, this paper aims to: 1) describe the different types of tobacco-related products available on crypto-markets and the size and scope of the tobacco trafficking on crypto-markets; 2) characterize the vendors who offer tobacco products on crypto-markets as well as their involvement in the sale of other products and; (3) assess the place of tobacco trafficking in relation to other major categories of products offered on crypto-markets. This paper will be descriptive in nature as it is one of the first to study the illicit trade of licit products on the dark net and crypto-markets.

The paper is divided into four sections. Section I presents the current state of research on tobacco trafficking. Section II discusses the evolution of illicit online markets and explains how and why tobacco traffickers have come to adopt the dark net to illicitly trade tobacco. It also presents the research design and methods. Section III presents the analysis that has allowed us to describe and understand tobacco trafficking on crypto-markets. Finally, Section IV discusses the findings and finds that tobacco traffickers are important players in the crypto-market ecosystem.

I. Tobacco Trafficking

Tobacco trafficking can take many forms, depending on the geographic area and time studied. The rarest form of tobacco trafficking – albeit increasing – produces and distributes rolled cigars known as *cheroots* and other tobacco products such as chewing tobacco, raw tobacco and rolling tobacco (World Customs Organization, 2015). A second, more common form of trafficking centres around the illicit production and distribution of brand name cigarettes (KPMG, 2016; Transcrime, 2013) which accounted in 2015 for 9% of all tobacco trafficking (KPMG, 2016). The third and even more common form of tobacco trafficking is the illicit production and distribution of generic tobacco products that does not abuse well-known trademarks. These 'no-name' cigarettes are often produced in clandestine factories and represent much of the illicit tobacco in circulation (Transcrime, 2013). This type of traffic has, however, been declining for the past decade in favor of a fourth form of traffic known as *cheap whites* (Von Lampe, 2005; Joossens & Raw, 2012). Cheap whites are cigarettes legally manufactured in one country but diverted to another country where they are not officially available. Exporting is done legally by paying the required taxes, but importing and selling in the destination countries is illegal as payment of taxes is avoided upon arrival (Transcrime, 2013). Cheap whites accounted for

around 35% of the tobacco trafficking market in 2015, with an upward trajectory since 2006 (KPMG, 2016).

Tobacco trafficking is not a new phenomenon by any means. It has been known to exist since legal tobacco was first marketed as a valuable product (Joossens & Raw, 2012) and represents an important issue for many nation states (Joossens & Raw 1995; Joossens et al., 2000; Coker, 2003; Collin et al., 2004; Antonopoulos, 2006; van Dijck, 2007; Ben Lakhdar, 2008). From a *public health* perspective, increased tobacco consumption and high mortality rates have led to tobacco control through state intervention. Tobacco trafficking brings into circulation tobacco products of unknown quality. Tobacco trafficking also leads to increased availability and accessibility of tobacco in general. Populations such as minors who have no legal access to tobacco products can turn to traffickers for the products they want. Finally, contraband cigarettes are offered at a lower price than legal cigarettes, which encourages consumption of tobacco by decreasing the economic costs associated with tobacco use. From a *public finance* perspective, tobacco trafficking leads to significant financial losses for states (Joossens & Raw, 1995; Coker, 2003; Joossens & Raw, 2012). Tobacco taxes account for a significant portion of state revenues and are necessary to fund many policies, including public health policies. The impact of tobacco trafficking on EU tax revenues is estimated at € 11 billion (KPMG, 2016). Tobacco trafficking can also impact *public safety* as conflicts between actors involved in the trafficking of tobacco can lead to episodes of violence.

Tobacco traffickers are drawn to trafficking mainly because of the potential economic gains it generates and can be categorized based on their roles and the size of their traffic (Antonopoulos, 2006). In France, for example, the lowest form of traffic is done by individuals who bring home from foreign trips more cigarettes than they are legally allowed with the intent to resell them in their neighborhood (Lalamet et al., 2012). One step above is the professional amateur whose profession consists of shuttling back and forth across borders with cigarettes. They use modified cars and vans and sometimes manage a team of drivers who merely transport goods from point A to point B (Lalam et al., 2012). Professional networks are also active in tobacco trafficking. They buy cigarettes overseas in bulk and use fast transport companies to cross borders until their intended destination where a wholesaler is responsible for the distribution of the tobacco products. Transcrime (2013) estimates the number of people involved in tobacco trafficking in Europe alone to be between 100,000 and 150,000 with a large portion active in transnational organized criminal networks. Their trafficking would yield significant benefits and would be a source of funding for other criminal activities (Joossens et al., 2000) such as drugs, arms and human trafficking (WHO, 2015). These forms of trafficking are all integrated into the same networks as they all aim to send goods and people across borders. In conjunction with these actors, past research has identified the tobacco industry as a willing participant of tobacco trafficking. Trafficking was apparently used as a strategy to develop the tobacco market in certain states (Collin et al., 2004; Gilmore et al., 2015) and to counter the decline in the number of tobacco users in others (Joossens & Raw 1998; Dubois & Tramier, 2002; Gilmore et al., 2015). This has led many countries to take legal action against tobacco manufacturers for tax losses incurred because of their trafficking (Dubois & Tramier, 2002; Calderoni, 2014). The involvement of tobacco manufacturers in trafficking would now be a thing of the past following the signing of a co-operation agreement between several countries and these manufacturers. The agreement aims to

improve the prevention of trafficking, the fight against the illicit market and the introduction of means of monitoring and tracing tobacco products (Calderoni, 2014).

While there is no specific profile for tobacco trafficking customers, two large populations stand out: low-income and underage individuals (Gostin, 2007). Low-income individuals are prime targets for tobacco traffickers (Joossens & Raw, 1998) as they are more likely to look for lower-cost alternatives to legal cigarettes. Underage individuals are also good customers for traffickers as they are likely to smoke for a long period and therefore make repeat purchases (Glantz, 1996). In many cases, trafficked cigarettes are the only available option for underage individuals looking to smoke. Studies have shown unsurprisingly that underage individuals are more likely than adults to smoke contraband cigarettes, at least in certain countries like Iran (Heydari et al., 2010).

Just like its legal counterpart, the illicit tobacco trade takes place on an international scale (Transcrime, 2013). The routes used for trafficking are varied and differ depending on the type of product, the local prices, the number of potential customers and the strategic positioning of countries. For this purpose, countries can be categorized as countries of production, of transit or of destination though a country may sometimes be one, sometimes the other, and sometimes the three at the same time (Transcrime, 2013). In North America, the First Nations that sit across the U.S.A. – Canadian border has been identified as key producers and distributors of cigarettes, in large parts thanks to the absence of tax officers and effective law enforcement in their territories. In Europe, cigarettes are often smuggled through Northern Europe and the ports of Antwerp, Rotterdam and Hamburg (Joossens & Raw, 1995). More recently, the trafficking routes have extended to many more countries like Russia, China, U.A.E., Belarus, Ukraine, Moldova, Latvia, Turkey, Poland, Egypt and Serbia (Transcrime, 2013). Cigarettes then transit through a number of countries like Greece and Italy to circumvent taxes and eventually end up in destination countries like the United Kingdom, Italy, Germany, Romania, Ireland, Latvia, Poland, Spain, Bulgaria and France where the volume of cigarettes is very high (Transcrime, 2013).

II. The Shift to Online Tobacco Trafficking

Over the past forty years, communication technologies have enabled the development of online trading platforms which have become significant mediums through which economic activity is facilitated. Companies such as Amazon and eBay can bring together sellers and buyers from around the world and use national or private postal services to deliver the purchased goods. Although many doubts have been raised about online markets in their early days, they are increasingly replacing physical stores.

Many entrepreneurs took notice of the emergence of legitimate online markets and launched similar platforms that specialized in the sale of illicit goods and services. Hosted on chat-rooms and discussion forums, these first generation online illicit markets (Dé Cary-Hétu, 2015) are convergence settings (Soudijn & Zegers, 2012) that bring together thousands, and sometimes even more, offenders (Motoyama et al., 2011) who can contact each other directly and without intermediaries (Dé Cary-Hétu & Laferrière, 2015). Their main purpose is to facilitate the sale of illicit goods and services and to disseminate information on offenders' best practices. Online illicit markets provide a history of participants' activities (Yip et al., 2013). This allows their participants to go back in time to assess the reliability of other participants before dealing with them. Online illicit markets



are controlled by anonymous administrators who put in place ground rules and ensure that participants respect them (Peretti, 2008). Administrators therefore do not have direct authority over participants, who are free to act as they wish within the limits of the market rules. Administrators may represent the only line of protection for participants who must constantly be wary of other participants who are always inclined to act opportunistically (Allodi et al., 2016). It is impossible for participants to turn to the courts or the police when a partner does not comply with the agreements (Reuter, 1983). Contract management is therefore very problematic and opens the door to peer victimization (Franklin & Paxson, 2007).

First generation online illicit markets have attracted many offenders but have gradually lost their appeal mainly due to the high level of internal fraud (Lusthaus, 2012, Holt et al., 2016). Buyers have a hard time finding reliable partners from whom to buy illegal goods and services, making often moot the use of online illicit markets. Moreover, law enforcement agencies have been monitoring and targeting first generation online illicit markets in recent years (Poulsen, 2011; Grabosky, 2007). They have conducted numerous police operations that have cast doubt on the security that these markets can provide. Indeed, the seizure of a server hosting a market leads police forces directly to the messages, the contact information and especially the IP addresses of the participants in these markets. These important issues have led entrepreneurs to seek new means to increase the safety of participants in online illicit markets. This response came in the form of crypto-markets (Martin, 2014), the second generation online illicit markets. These markets share many of the visual cues of legitimate online sales platforms like Amazon and eBay. Their home pages are composed of product grids, each with an image, a title, a price, the name of the seller and an indication of quality based on feedback from past buyers (often a series of 1 to 5 stars) (Christin, 2013). Each product for sale has its own web page, and include, in addition to the information presented above, details of past buyers' comments, the costs of sending products by post and the list of countries where the product can be sent (Aldridge & Décary-Héту, 2016). Each vendor also has their own page with their vendor name, a description, an account creation date, the date of their last visit to the crypto-market and a summary of the evaluations of former buyers who have dealt with the seller (Demant & Branwen, 2016). This page also presents the public PGP key of the vendor which allows buyers to encrypt a message that can only be decrypted by the vendor.

Crypto-markets are sophisticated e-commerce platforms that enable the sale and purchase of any licit or illicit products and services. In addition to the use of PGP to encrypt messages, crypto-markets are hosted on the Tor network (Dingledine et al., 2004), a subsection of the internet where the localization of crypto-market servers and their participants is made very difficult using computer proxies. Tor's anonymity has been questioned on numerous occasions (Goldberg, 2006; Snader & Borisov, 2008), in particular because of the opacity of the identity of the entities controlling the proxies. No evidence exists at this time to demonstrate that the Tor network is unsafe. Crypto-markets also require that payments be made in virtual currencies like the bitcoin (Nakamoto, 2009). Virtual currencies' characteristics vary but most of them offer an anonymous means of payment that can be very difficult to tie to a real identity.

The first crypto-market was launched in February 2011. Named Silk Road (SR1), it quickly attracted the attention of the media (Chen, 2011) and politicians (NBC, 2011). Active for more than two and a half years, this crypto-market generated sales of over \$ 200 million US dollars (Sydney Morning Herald, 2015). In October 2013, US police

announced the seizure and closure of the crypto-market but in the weeks that followed, many new crypto-markets were launched. A major police operation in the fall of 2014, Operation Onymous, led to the closure of another series of high-profile crypto-markets (Décary-Hétu & Giommoni, 2016) but these upheavals in the crypto-markets did not succeed in reducing the interest for and popularity of crypto-markets. Soska & Christin (2015) and Kruithof et al. (2016) showed that sales on crypto-markets have increased since SR1 and now account for hundreds of millions of dollars per year. Décary-Hétu & Giommoni (2016) also demonstrated that the impact of police operations had been very limited over time. The main use cases of crypto-markets was for the first years the sale of illicit drugs (Christin, 2013). Diversification has taken place over the last months and years, however, with a much more diversified range of products now available on crypto-markets. This is the result of efforts by the administrators to differentiate their crypto-market from other active crypto-markets. Given that the administrators' revenues come from commissions on sales, administrators seek to maximize the number of transactions and the average transaction price. To achieve this, administrators develop new markets including the sale of stolen financial and personal data, computer hacking and, of interest for this research, tobacco products.

Past research on crypto-markets has so far focused on the sale of illicit drugs on crypto-markets. They have explored the rules of crypto-markets (Christin, 2013; Martin, 2014), the political motivations of crypto-market participants (Bakken, 2015; Maddox et al., 2016), the impact of crypto-markets on public health (Nasseri, 2015; Barratt et al., 2016) and the sale of drugs in general (Van Hout, 2015; Cullen, 2015; Caudevilla et al., 2016). Although of great interest, these studies have provided little information on the size and magnitude of trafficking in other types of products on crypto-markets, including tobacco trafficking. The purpose of this paper is to build on past research in the literature and describe and understand the shift to crypto-markets in tobacco trafficking. More specifically, this paper aims to: 1) describe the different types of tobacco-related products available on crypto markets and the size and scope of the tobacco trafficking on crypto-markets; 2) characterize the vendors who offer tobacco products on crypto-markets as well as their involvement in the sale of other product and; (3) assess the place of tobacco trafficking in relation to other major categories of products offered on crypto-markets.

III. Research Design and Methods

The data used for this paper were collected in the Fall of 2016 using the DATACRYPTO software tool (Décary-Hétu & Aldridge, 2015). DATACRYPTO is a software that automatically collects all the pages of a website and then extracts the relevant information to create a structured database. To do this, the researcher must tell DATACRYPTO the URL of the home page of a website. The software then starts up and downloads this first page. All hyperlinks to other pages on the site are saved in a database and they are visited sequentially to find other hyperlinks. Once all hyperlinks are indexed and visited, DATACRYPTO goes into its extraction mode and retrieves the relevant information from the webpages identified. In the case of listings, this includes the title of the listing, its description, its price, the name of the seller, the country where the product is shipped from and the countries of eligible deliveries, as well as the comments of past buyers. In the case of vendors, the information retrieved includes the vendor's name,



the account registration date, the description, the peer reviews (often a rating of 5) and a public PGP encryption key.

Although very effective, DATACRYPTO is not always able to collect webpages from crypto-markets. This can be the case when the crypto-market has anti-surveillance protections or when the crypto-markets are programmed so poorly that it prevents the DATACRYPTO software from performing its work. For this reason, 3 crypto-markets had to be indexed by hand to identify listings associated with tobacco trafficking. This manual collection has raised a total of 26 listings. For financial and time reasons, other listings on these markets could not be collected. Our sample data overall contains 147,560 listings from 14 different crypto-market (Minimum = 1; Maximum = 54,697; Mean = 10,543; SD = 18,696) and provides a representative picture of the state of crypto-markets in the Fall of 2016.

While the data collected is of a relatively high quality, some manipulations had to be made before the analyses. While most vendors list where they ship their products from and where they are willing to ship their products to, some only list the region where they operate (ex: Europe) and others are even vaguer, stating that they are active all over the world. These mentions were cleaned to group listings and vendors in countries whenever possible, and when not, by region.

Moreover, as each crypto-market has its own classification scheme, we created our own classification made up of 10 categories. Illicit drugs are categorized into seven categories, namely *cannabis*, *ecstasy*, *stimulants*, *psychedelic*, *prescriptions* and *opioids*. Appendix A provides details of the composition of these categories. Another category includes the *multi-drug listings*, for example, those offering cocaine and ecstasy. The *drug-related* category includes products such as syringes that allow drug users to use drugs. The *other products* category includes all other non-tobacco-related products such as counterfeits, weapons, software (including hacking), digital information and products related to fraud. The last category is for all *the tobacco-related products*. As many crypto-markets were monitored as part of this research, it is possible that vendors had multiple accounts on the different crypto-markets.

To identify sellers with multiple accounts and aggregate their activities, the methodology developed by Rhumorbarbe et al. (2016) was used. This is based on the use of PGP public key. As each key cannot be used by more than one vendor, every vendor who uses the same PGP key is believed to be the same vendor. Our data initially counted 5,958 different vendors. Once the analysis of the PGP public key was completed, the number of unique vendors decreased to 4,295. This will be the sample used for this paper. The last manipulation focuses on the price of listings. Vendors who are out of stock or unable to ship their products tend to increase the price of their listings by one or two orders of magnitude. This allows sellers to continue to display their listings and enjoy the visibility they offer while making new orders prohibitive. Obviously, the use of such excessive prices could have an impact on our sales revenue estimates. To work around this problem, the price of each listing is compared to its historical price over prior data collection. We selected the median price for each listing to remove the effect of increased prices. So, if a listing had been seen five times by DATACRYPTO over the previous months with prices of \$10, \$10, \$11, \$11 and \$10,000, the median price would be \$11, very close to the actual price of the listing. For each ad, we have in our database an average of 5 price observations (Min = 1, Max = 17; SD = 4). This listing price was used to estimate the revenues of vendors. Customers are strongly encouraged to leave a public feedback after each transaction. Multiplying the amount of feedback by the price of the

listings is a peer-reviewed methodology to estimate revenues of vendors on crypto-markets (Soska & Christin, 2015). An estimate by Kruithof et al. (2016) indicates that about 80% of buyers leave a comment following a purchase. This would mean that estimates based purely on the number of comments only represent a minimum level of income and a 1.25 factor should be applied to all revenues presented in the Results section. We could apply this equivalence factor from the start, but we preferred to use the raw numbers so that future studies can more easily compare their results with ours. The discussion of results will consider the equivalence factor to provide a more accurate picture of the tobacco trafficking on crypto-markets.

The descriptive analyses will follow each of the three specific objectives. The first series of analyses will describe the different types of tobacco-related products available on crypto-markets and estimate the size and scope of the tobacco trafficking on crypto-markets. The second series of analyses will characterize the vendors who offer tobacco products on crypto-markets as well as their involvement in the sale of other products. Finally, the last series of analyses will take a more macro approach and assess the place of tobacco trafficking in relation to other major categories of products offered on crypto-markets.

Describing and Understanding the Shift to Crypto-markets in Tobacco Trafficking

Crypto-markets were at first mostly involved in the sale of illicit drugs. More recently, however, crypto-markets moved to diversify their activities and have now become active in tobacco trafficking. Table 1 presents the various tobacco-related products offered on the 14 crypto-markets we monitored.

476 listings related to illicit tobacco trafficking were identified on the different crypto-markets we monitored. These listings generated at least 263 feedbacks within the 30 days prior to the data collection, indicating that at least 263 tobacco-related transactions were completed. These listings generated a minimum income of \$6,304 for the same period and \$75,648 at an annual rate.

To differentiate the different tobacco products offered on crypto-markets, 13 categories of products were created. The *rolling tobacco* refers to tobacco which allows the consumer to make his own cigarettes using rolling paper. It is usually sold in grams. The *cigarettes* include listings that mainly selling large quantities of cigarettes, notably in cartridges of 200 units. Many well-known brands of cigarettes are on sale on crypto-markets such as Marlboro, LD, Lambert & Butler, Camel, Chesterfield, Davidoff, L & M, Lucky Strike, Vogue and Winston. Of these, the Marlboro and Camel brands are by far the most popular. Unfortunately, the listings do not allow us to determine whether the products offered are genuine products or counterfeit. The *cigars* include products identified as pure and of Cuban origin. The *e-cigarettes* refer to the various models of electronic cigarettes available on the market, that is to say, rechargeable devices that use e-liquid or cartridges. The *e-cigarette accessories* include these cartridges and spare batteries or wires to recharge the battery of *e-cigarettes*. *Pipes* include listings for pipes. While it is possible that some pipes may be used to smoke drugs, the lack of precision has led us to consider them as potential tobacco pipes. The *rolling papers*, as the name suggests, includes papers, with or without flavor, to make cigarettes. The *E-liquid* and *E-liquid non-nicotine* categories combine the substances that produce steam from electronic cigarettes. Some e-liquids contain nicotine and others do not. The e-liquids of both categories can also be flavored to different

flavors. The other categories, *lighters*, *coupons*, *deep web advertisement* and *joints with tobacco* together account for less than 2% of listings and just over 1% of revenues. They include various lighter sizes, discount coupons for the legal purchase of cigarettes, a promotion of a crypto-market specializing in tobacco products, and joints consisting of a mixture of cannabis and tobacco. The most important classes in terms of advertisements, sales and income are cigarettes, rolling tobacco and rolling tobacco. Cigarettes represent more than 40% of listings and revenues generated in the last 30 days. The e-cigarettes account for nearly 20% of listings, but generated only 11% of revenues. Rolling tobacco listings represents 10% of listings and 14% of revenues. The e-cigarette accessories are well represented for their part, especially since they generate 21% of revenues with only 5% of the listings.

Table 1. Distribution of tobacco listings on cryptomarkets

| | N LISTINGS | % LISTINGS | N MONTHLY TRANSACTIONS | % MONTHLY TRANSACTIONS | MONTHLY INCOME | % MONTHLY INCOME |
|---------------------------|------------|-------------|------------------------|------------------------|----------------|------------------|
| Cigarettes | 198 | 42% | 65 | 25% | \$2,838 | 45% |
| E-cigarettes | 90 | 19% | 26 | 10% | \$666 | 11% |
| Rolling tobacco | 47 | 10% | 79 | 30% | \$848 | 14% |
| Pipe | 35 | 7% | 13 | 5% | \$466 | 7% |
| E-cigarette accessories | 24 | 5% | 65 | 25% | \$1,327 | 21% |
| Rolling Papers | 24 | 5% | 1 | <1% | \$8 | <1% |
| E-liquid | 22 | 5% | 3 | 1% | \$39 | <1% |
| Cigars | 19 | 4% | 7 | 3% | \$35 | <1% |
| E-liquid without nicotine | 8 | 2% | 0 | 0% | \$0 | 0% |
| Lighters | 4 | <1% | 2 | <1% | \$6 | <1% |
| Coupons | 2 | <1% | 2 | <1% | \$71 | <1% |
| Joints with tobacco | 2 | <1% | 0 | 0% | \$0 | 0% |
| Deep web advertisement | 1 | <1% | 0 | 0% | \$0 | 0% |
| Total | 476 | 100% | 263 | 100% | \$6,304 | 100% |

Table 2. Distribution of countries where vendors ship tobacco products from

| Country | N LISTINGS | % LISTINGS | MONTHLY INCOME | % MONTHLY INCOME |
|-----------------------|-------------------|-------------------|-----------------------|-------------------------|
| <i>North America</i> | (157) | (33%) | (\$2,545) | (40%) |
| Unknown origin | 6 | 1% | \$0 | 0% |
| USA | 151 | 32% | \$2,545 | 40% |
| <i>Europe</i> | (184) | (39%) | (\$2,833) | (44%) |
| Unknown origin | 75 | 16% | \$991 | 16% |
| UK | 52 | 11% | \$1,600 | 25% |
| Ukraine | 39 | 8% | \$46 | <1% |
| Germany | 10 | 2% | \$182 | 3% |
| Poland | 8 | 2% | \$14 | <1% |
| Australia | 9 | 2% | \$409 | 7% |
| Other countries (8) * | 12 | 2% | \$0 | 0% |
| Worldwide | 55 | 12% | \$518 | 8% |
| Unknown country | 59 | 12% | \$0 | 0% |
| TOTAL | 476 | 100% | \$6,304 | 100% |

*Other countries: Belgium, Estonia, Finland, France, China, Ireland, Norway, Romania.

Table 3. Distribution of countries where vendors ship tobacco products to

| Country | N LISTINGS | % LISTINGS |
|----------------------|-------------------|-------------------|
| <i>North America</i> | (81) | (17%) |
| Unknown destination | 15 | 3% |
| USA | 66 | 14% |
| <i>Europe</i> | (72) | (15%) |
| Unknown destination | 25 | 5% |
| UK | 41 | 9% |
| Germany | 6 | 1% |
| Australia | 8 | 2% |
| Other countries* | 7 | 2% |
| Worldwide | 343 | 72% |
| Unknown Destination | 22 | 5% |

* Other countries: New Zealand, Austria, Finland, Sweden, Norway, France, Ireland, Mexico, Canada, Brazil, Japan, Russia among others.

In 88% of cases, listings advertised the country where their product for sale was shipped from. Providing this information tends to attract domestic buyers who do not want their delivered packages to go through customs. The main shipping region is Europe with 39% of all listings and 44% of revenues. Within Europe, the United Kingdom is very active; it is the most important country in Europe and the second worldwide. It generates more than a quarter of total revenues with only 52 of 476 listings (11%). 16% of all listings and sales come from Europe, without being able to specify more the origin. North America, and mainly the United States, is the second-largest region with 33% of all listings and 40% of sales. The United States is the most important country worldwide with 32% of listings and 40% of revenues for a monthly total of US \$ 2,545.

Tobacco products have 7 major destination countries or regions. Of these destinations, the vast majority of tobacco products (72%) are destined to be sent worldwide. The United States is the second most popular destination, representing the destination country of about 14% of tobacco listings on crypto-markets. 41 listings (9%) have the United Kingdom as their destination country, making it the third most important destination for tobacco products. A small 5% of the listings are intended for the European continent, without specifying the countries of destination. 22 other listings, which also represent 5% of the total amount of tobacco listings, do not present any information on the possible countries of destination of their products.

Crypto-markets host the activity of thousands of vendors. In our sample, 4,295 vendors could be identified. Out of those, only 2% (N = 72) were involved in tobacco trafficking. Their activities were, however, far ranging.

Table 4. Diversification of activities of tobacco traffickers on cryptomarkets

| Categories | N VENDORS | % VENDORS | MONTHLY INCOME OF VENDORS |
|-----------------------|--------------|--------------|------------------------------|
| Tobacco products | 72 | 100% | 6,304\$ |
| Others products | 42 | 58% | 13,247\$ |
| Cannabis | 35 | 49% | 400,741\$ |
| Prescription | 21 | 29% | 17,098\$ |
| Psychedelics | 16 | 22% | 18,011\$ |
| Stimulants | 15 | 21% | 7,859\$ |
| Drug-related products | 15 | 21% | 2,151\$ |
| Ecstasy | 12 | 17% | 5,051\$ |
| Opioids | 7 | 10% | 607\$ |
| Multi-drug listings | 4 | 6% | 31\$ |
| TOTAL | | | 471,100\$ |

Table 4 presents the activities of vendors involved in tobacco trafficking on crypto-markets. The table shows that 58% of vendors are involved in the sale of other products such as counterfeit products (other than tobacco products), weapons, software (including hacking) and stolen personal and financial information. These listings, on the other hand, only generated revenues for all vendors of \$ 13,247 per month. The main activity of

vendors involved in tobacco trafficking, apart from this traffic, appears to be the sale of drugs, with almost half (49%) involved in the sale of cannabis. Between 17% and 29% of vendors are involved in the sale of prescription, psychedelics, stimulants and ecstasy. Although revenues from tobacco products are relatively low (\$6,304 in the last month), the strong diversification of the vendors has allowed them to generate much higher revenues that amount to \$471,100 per month. This represents almost 3% of the total revenues generated on all crypto-markets for the same period. Extrapolating this amount over 12 months, these vendors have the potential to generate revenues of nearly \$6 million annually.

Table 5. Distribution of activities related to tobacco trafficking across tobacco traffickers

| | Min | Max | Average | Total |
|-------------------------------------|-----|---------|-----------------|----------------|
| Number of listings | 1 | 89 | 7 (SD=13) | 476 |
| Number of transactions (past month) | 0 | 51 | 4 (SD=8) | 263 |
| Income (past month) | \$0 | \$1,220 | \$88 (SD=\$214) | \$6,304 |

Table 6. Distribution of activities on crypto-markets

| Categories | N LISTINGS | % LISTINGS | MONTHLY TRANSACTIONS | % MONTHLY TRANSACTIONS | MONTHLY INCOME | % MONTHLY INCOME |
|------------------------|----------------|-------------|----------------------|------------------------|----------------------|------------------|
| Others products | 57,908 | 39% | 17,269 | 18% | \$ 1,513,960 | 8% |
| Cannabis | 25,664 | 17% | 25,694 | 27% | \$ 4,557,483 | 25% |
| Prescription | 22,750 | 15% | 14,907 | 16% | \$ 2,163,302 | 12% |
| Ecstasy | 15,711 | 11% | 9,159 | 10% | \$ 2,187,664 | 12% |
| Stimulants | 12,110 | 8% | 15,144 | 16% | \$ 3,425,060 | 19% |
| Psychedelics | 8,904 | 6% | 8,143 | 9% | \$ 3,471,593 | 19% |
| Opioids | 2,571 | 2% | 3,972 | 4% | \$ 717,690 | 4% |
| Drugs-related products | 1,336 | 1% | 454 | <1% | \$ 11,623 | <1% |
| Tobacco products | 476 | <1% | 263 | <1% | \$ 6,304 | <1% |
| Multi-drug | 130 | <1% | 58 | <1% | \$ 5,649 | <1% |
| TOTAL | 147,560 | 100% | 95.063 | 100% | \$ 18,060,328 | 100% |

Tobacco traffickers managed between 1 and 89 listings each on crypto-markets. On average, a vendor posts 7 different listings though that number varies considerably between vendors. The number of transactions in the past month ranges from 0 to 51 for each vendor. Thus, sellers completed an average of 4 transactions each in the last 30 days for a total of 263. The large dispersion in the number of transactions indicates an imbalance in the distribution of transactions among vendors. The most prolific tobacco vendor has only managed to generate revenues of \$1,220 in the last month from his tobacco trafficking. Moreover, since the average revenue of tobacco products for each vendor is less than \$100, tobacco trafficking is not a full-time occupation. It may, however, generate some additional profits to those made through the sale of other types of products.

The 476 listings of tobacco products account for less than 1% of all listings recorded on the crypto-markets and hold a very small market share. Indeed, considering the total earnings of over \$18 million in the past month, the \$6,304 generated by tobacco trafficking account for 0.03% of the total market share. 8 categories generated more revenue than the sale of tobacco in the last month. The most popular products on crypto-markets are drugs, mostly cannabis, psychedelics and stimulants. Other products, although they have not generated as much revenue as the previously mentioned categories, do account for 39% of all listings generating, however, 8% of all income.

IV. Discussion and Conclusion

Tobacco trafficking is an international phenomenon that has now shifted parts of its activities on the dark net and crypto-markets. The number of transactions and the revenues generated by tobacco trafficking on crypto-markets is difficult to accurately estimate since some transactions may not lead to public feedbacks. The best estimate available has found that about 80% of sales lead to a public feedback than can be indexed (Kruithof et al., 2016). Using this metric, we can estimate the total revenues generated by tobacco trafficking on crypto-markets at approximately \$7,880 per month in the Fall of 2016 or to \$94,560 on an annualized basis. Our results suggest that tobacco traffickers on crypto-markets are important participants. Although they account for only 2% of all vendors, tobacco traffickers account for 3% of all crypto-market sales. Paquet-Clouston (2016) had already stressed that sales on crypto-markets are concentrated in the hands of a small number of vendors and that although there is a strong competition, very few vendors made significant sales. Being a tobacco trafficker could therefore be a criterion for quickly identifying the actors among the vendors who have performed better than the others. These vendors would be prime targets for the disruption of crypto-markets activities as their operations control many sales.

There is no denying that tobacco trafficking is still marginal on crypto-markets. This result is not surprising in itself. Christin (2013) did not present illicit tobacco trafficking as one of the top 20 product categories in his first study. This was also the case in his second study (Soska & Christin, 2015) where tobacco was not among the 10 most popular categories although this type of traffic still had its own category at the same level as cannabis, ecstasy and prescription. Other studies on crypto-markets have also shown that tobacco trafficking was not among the six most active categories (Aldridge & Décary-Héту, 2016) and that the proportion of tobacco listings was less than 1% of all listings displayed on crypto-markets (Kruithof et al., 2016). The low presence of tobacco on

crypto-markets should not, however, prevent us from continuing research on tobacco trafficking in crypto-markets and the dark net in a broader sense mainly due to the increase in the number of listings in the past few months. Kruithof et al. (2016) had found only 70 tobacco-related listings and this number has increased in recent months. This suggests that traffickers are now more interested in crypto-markets as a distribution channel for their products and that the prevalence of tobacco trafficking in crypto-markets may increase in the coming years. This movement could be increased by the arrival of new vendors involved in polytrafic, which generates significant sales.

The low prevalence of listings related to illicit tobacco trafficking can be explained in part by the nature of the actors involved in tobacco trafficking (Jamieson, 1999; van Dijck, 2007; Lalam et al., 2012; Calderoni, 2014). Individual entrepreneurs probably do not have the necessary infrastructure and inventories to fuel sales on large platforms like crypto-markets. Their supply would also be too irregular to be able to fulfill all orders from customers. At the other end of the spectrum, large international organizations involved in tobacco trafficking have relatively little to gain from adopting crypto-markets as a distribution channel. These organizations already have well-established distribution networks that reach a large customer base. Crypto-markets represent an opportunity for them to improve their sales by reaching a wider and more international audience, but at the moment there is no indication that customers will be on there to make purchases. This is a classic dilemma where, without a sufficient supply, customers will not be interested in sourcing tobacco products from crypto-markets. Without sufficient demand, traffickers will also not be interested in investing in this criminal technological innovation, thus limiting the interest of consumers. With customers and traffickers who are already reaching the physical world without too much risk, the creation of a new virtual distribution channel becomes less urgent.

New regulations of tobacco could however lead to an increase in the illicit trade of tobacco on crypto-markets. A recent study (Martin et al., 2018) suggests that a Scheduling change in the United States for prescription opioids coincided with an increase in the proportion of American-based crypto-market sales that were for prescription opioids. At the international level, the proportion of sales for prescription opioids remained the same before and after the Scheduling change. This suggests that customers and vendors of licit products may be willing to move to crypto-markets once the legal supply of a product is constrained. Moreover, the changes in tobacco control such as the banning of sponsoring sports events by tobacco companies (Furlong, 1994) and high taxes have contributed to create a black market for tobacco products. Prohibition and enforcement has been known to increase the price of goods and services (Caulkins & Reuter, 1998). Combined, these forces may work together to fuel a new lucrative market on crypto-markets for the illicit trade of tobacco products and further research will be needed to model the potential growth of this market.

The lack of enthusiasm for tobacco trafficking on crypto-markets could also be explained by three other hypotheses. First, the risks associated with the use of crypto-markets remain difficult to study. Branwen (2016a) identifies a few hundred arrests related to the use of crypto-markets among buyers, vendors and administrators of crypto-markets, but none of them can be linked to online tobacco sales. This suggests that the level of impunity for tobacco traffickers on crypto-markets is high, but the novelty of crypto-markets does not leave enough room for the various actors to rigorously establish the level

of risk associated with crypto-markets. These risks are more than mere arrest. Many crypto-markets have closed their doors in recent years (Branwen, 2016b). Closures are in some cases linked to police operations (Décary-Héту & Giommoni, 2016), but also to internal fraud by administrators of the crypto-markets (Deepdotweb, 2013; Deepdotweb, 2015). During such closures, vendors and customers lose their way to communicate with each other as well as the money deposited in their accounts on the crypto-markets. Participants can guard against the inconvenience of these closures by agreeing on alternative methods of communication and keeping only the minimum amount of bitcoins in their accounts but these solutions take time and planning. The uncertainty surrounding the survival of specific crypto-markets could thus limit the desire of traffickers and their customers to invest in this new electronic platform.

A final hypothesis to explain the low presence of traffickers involved in smuggling of tobacco on crypto-markets could be the technological and technical challenges posed by the use of crypto-markets for the sale of physical contraband goods. Crypto-markets require that their participants use the Tor network to camouflage their identity, receive and send bitcoins, and encrypt their communications using PGP keys (Martin, 2014). These technologies have become much more democratic in recent years, but there is still a certain learning curve to use these technologies in a totally safe way. Both traffickers and consumers may not be comfortable with the use of these technologies and may therefore be reluctant to engage in tobacco trafficking on crypto-markets. Tobacco trafficking on crypto-markets also assumes a clear ability to camouflage tobacco products in postal items and to ensure that contraband products are not intercepted in transit to customers. Volery (2015) explains in detail all the work necessary to cover up illegal products sent by post. In this context, many traffickers may correctly judge that they do not have the necessary capabilities to prepare such shipments. In order to sell on crypto-markets, traffickers must also be able to obtain sufficient quantities of postal material such as envelopes and stamps. Specific challenges are associated with the supply of these resources, which could further limit the willingness of individuals involved in illicit tobacco trafficking to embark on business on crypto-markets.

Despite the current lack of interest in tobacco trafficking in crypto-markets, this research has helped to better understand the profile of traffickers involved in tobacco trafficking. Joossens et al. (2002) and WHO (2015) had already highlighted the hybrid nature of these traffickers who were involved in illicit tobacco trafficking but also in many other criminal activities. The study of trafficking on crypto-markets allows us to better quantify the extent of the links between the different types of activities of traffickers. At the international and European level, the links between illicit tobacco trafficking seem particularly pronounced with the trafficking of cannabis, prescriptions, psychedelics, stimulants and other products. These links suggest that the same distribution channels could be used for both illicit drugs and tobacco. Therefore, the study of a type of traffic could give answers on other types of traffic.

The crypto-markets represent one of the simplest yet most fascinating criminal innovations of the past recent years. Their effectiveness at facilitating relations between offenders allowed them to become a significant player in the sale of illicit drugs online. The big question now is whether the exponential growth of crypto-markets and illicit online markets in general will continue in the coming years. These markets should indeed use the postal service to deliver their parcels and these services could increase their ability to intercept packages containing illicit drugs in the coming years. Organic limit will also

apply to these markets because they could ensure that a majority of parcels contain illicit products. Alternatives were proposed by vendors to work around this problem, including the use of geo-location tools to dispose of goods sold. The buyer would receive GPS coordinates in a park or wood and could, at his leisure, pick up his package delivered by a local vendor.

Many doubts remain about the real anonymity that illicit online markets provide. The fact that police forces were able to locate and close the servers hosting SR and several other crypto-markets emphasized the fact that these markets are not immune to law enforcement. However, the low number of arrests of participants and market closures suggests that these achievements have required significant resources that cannot be mobilized on a regular basis. This suggests that illegal activities on dark net may continue to flourish over the next few years and that they will be a fertile breeding ground for traffickers as well as for researchers interested in them.

Conflict of Interest

This research was funded through a contract between the Université de Montréal and Philip Morris France to analyze tobacco trafficking on the darknet. Philip Morris France did not modify or impact the research design, results or discussion of this paper.

References

- Aitken, C. K., Fry, T. R. L., Farrell, L. & Pellegrini, B. (2009). Smokers Of Illicit Tobacco Report Significantly Worse Health Than Other Smokers. *Nicotine & Tobacco Research*. 11(8), 996-1001.
- Aldridge, J., & Décary-Hétu, D. (2014). NotAn'ebay for Drugs': The Cryptomarket 'SilkRoad' as A Paradigm Shifting Criminal Innovation. doi: 10.2139/ssrn.2436643
- Aldridge, J., & Décary-Hétu, D. (2016). Hidden Wholesale: The Drug Diffusing Capacity Of Online Drug Cryptomarkets. *International Journal of Drug Policy*. 35, 7-15. doi: 10.1016/j.drugpo.2016.04.020.
- Allodi, L., Corradin, M., & Massacci, F. (2016). Then And Now: On The Maturity Of The Cybercrime Markets The Lesson That Black-Hat Marketeers Learned. *IEEE Transactions On Emerging Topics In Computing*. 4(1), 35-46.
- Antonopoulos, G. A. (2006). Cigarette Smuggling: A Case Study Of A Smuggling Network In Greece. *European Journal Of Crime, Criminal Law And Criminal Justice*. 14(3), 239-255.
- Antonopoulos, G. A. (2007). The Greek Connection(S): The Social Organization Of The Cigarette-Smuggling Business In Greece. *European Journal Of Criminology*. 5(3), 263-288.
- Bakken, S. A. (2015). Silk Road 2.0-A Study Of Cryptomarkets In A Deleuze-Guattarian Perspective.
- Barratt, M. J., Ferris, J. A., & Winstock, A. R. (2016). Safer Scoring? Cryptomarkets, Social Supply and Drug Market Violence. *International Journal Of Drug Policy*. 35, 24-31. doi: 10.1016/j.drugpo.2016.04.019.
- Ben Lakhdar, C. (2007). Quantitative And Qualitative Estimates Of Cross-Border Tobacco Shopping And Tobacco Smuggling In France. *Tobacco Control*. 17(1), 12-16.
- Branwen, G. (2016a). Tor Black-Market-Related Arrests. Retrieved from <https://www.gwern.net/Black-market%20arrests>.

- Branwen, G. (2016b). Black-Market Risks. Retrieved from <http://www.guern.net/Black-market%20survival>.
- Calderoni, F. (2014). A New Method For Estimating The Illicit Cigarette Market At The Subnational Level And Its Application To Italy. *Global Crime*. 15(1-2), 51-76.
- Caudevilla, F., Ventura, M., Fornís, I., Barratt, M. J., Vidal, C., Quintana, P., & Calzada, N. (2016). Results Of An International Drug Testing Service For Cryptomarket Users. *International Journal Of Drug Policy*. 35, 38-41. doi: 10.1016/j.drugpo.2016.04.017.
- Caulkins, J. P., & Reuter, P. (1998). What price data tell us about drug markets. *Journal of Drug Issues*, 28(3), 593-612.
- Chen, A. (2011). The Underground Website Where You Can Buy Any Drug. Retrieved from <http://gawker.com/the-underground-website-where-you-can-buy-any-drug-imag-30818160>.
- Christin, N. (2013). Traveling The Silk Road: A Measurement Analysis Of A Large Anonymous Online Marketplace. *Proceedings of the 22nd International Conference on World Wide Web*. Rio de Janeiro, Brazil.
- Coker, D. (2003). Smoking May Not Only Be Hazardous To Your Health, But Also To World Political Stability: The European Union's Fight Against Cigarette Smuggling Rings That Benefit Terrorism. *European Journal of Crime, Criminal Law and Criminal Justice*. 11(4), 350-376.
- Collin, J., Legresley, E., Mackenzie, R., Lawrence, S., & Lee, K. (2004). Complicity In Contraband: British American Tobacco And Cigarette Smuggling In Asia. *Tobacco Control*. 13, 104-11.
- Cullen, A. L. (2015). "Illicit Drug Vending Online: The Decline of Traditional 'Street' drug Trading?"
- Décary-Héту, D. (2015). Online illicitmarkets. *SERENE-RISC Workshop Conference*. Ottawa, Canada.
- Décary-Héту, D., & Aldridge, J. (2015). DATACRYPTO: The Dark Web Crawler.
- Décary-Héту, D., Dupont, B., & Fortin, F. (2014). Policing The Hackers By Hacking Them: Studying Online Deviants In IRC Chat Rooms. In A. Masys, (ed.), *Networks And Network Analysis For Defence And Security*. New York, USA: Springer International Publishing.
- Décary-Héту, D., & D. Laferrière. (2015). Discrediting Vendors In Online Criminal Markets. In DANS Malm, A., & Bichler, G. (éds.), *Disrupting Criminal Networks: Network Analysis in Crime Prevention*. Boulder, USA: Lynne Rienner.
- Décary-Héту, D., & Giommoni, L. (2016). Do Police Crackdowns Disrupt Drug Cryptomarkets? A Longitudinal Analysis Of The Effects Of Operation Onymous. *Crime, Law and Social Change*. 67(1), 55-75.
- Deepdotweb. (2013). Sheep Marketplace Scammed Over 40,000,000\$ In the Biggest Darknet Scam Ever. Retrieved from <https://www.deepdotweb.com/2013/11/30/sheep-marketplace-scammed-over-40000000-in-the-biggets-darknet-scam-ever>.
- Deepdotweb. (2015). Evolution Marketplace Exit Scam Biggest Scam Ever. Retrieved from <https://www.deepdotweb.com/2015/03/18/evolution-marketplace-exit-scam-biggest-exist-scam-ever>.

- Demant, J. J., & Branwen, G. (2016). A Replication and Methodological Critique Of The Study. *International Journal of Drug Policy*. 35, 92-96.
- Demant, J. J., & Houborg, E. (2016). Personal Use, Social Supply Or Redistribution? Cryptomarket Demand On Silk Road 2 And Agora. *Trends in Organized Crime*. 21(1), 42-61.
- Dingledine, R., Mathewson, N., & Syverson, P. (2004). Tor: The Second-Generation Onion Router. Naval Research Lab Washington DC.
- Dubois, G. & Tramier, G. (2002). Cigarette Et Contrebandiers. In Ratte, S. Lutte Contre Le Tabagisme, Le Second Souffle. *Toxibase*, 5, 31-15.
- F.B.I. (2013). Manhattan U.S. Attorney Announces Seizure of Additional \$28 Million Worth of Bitcoins Belonging to Ross William Ulbricht, Alleged Owner and Operator of “Silk Road” Website. Retrieved from <https://archives.fbi.gov/archives/newyork/press-releases/2013/manhattan-u.s.-attorney-announces-seizure-of-additional-28-million-worth-of-bitcoins-belonging-to-ross-william-ulbricht-alleged-owner-and-operator-of-silk-road-website>.
- Fooks, G. J., Peeters, S., & Evans-Reeves, K. (2014). Illicit Trade, Tobacco Industry-Funded Studies And Policy Influence In The EU And UK. *Tobacco Control*, 23(1), 81-83.
- Franklin, J., & V. Paxson. (2007). An Inquiry Into The Nature And Causes Of The Wealth Of Internet Miscreants. *Proceedings Of The Conference On Computer And Communications Security*. Alexandria, USA.
- Furlong, R. (1994). Tobacco advertising legislation and the sponsorship of sport. *Australian Business Law Review*, 22(3), 159.
- Gilmore, A. B., & Reed, H. (2014). The Truth About Cigarette Price Increases In Britain. *Tobacco Control*. 23, 15-6.
- Gilmore, A. B., Fooks, G., Drope, J., Bialous, S. A., & Jackson, R. R. (2015). Exposing And Addressing Tobacco Industry Conduct In Low-Income And Middle-Income Countries. *The Lancet*. 385(9972), 1029-1043.
- Glantz, S. A. (1996). Preventing Tobacco Use - The Youth Access Trap. *American Journal Of Public Health*. 86(2), 156-157.
- Goldberg, I. (2006). On The Security Of The Tor Authentication Protocol. *International Workshop On Privacy Enhancing Technologies*. Cambridge, UK.
- Gostin, L. O. (2007). “Global Regulatory Strategies For Tobacco Control.” *JAMA*. 298(17): 2057-2059.
- Grabosky, P. (2007). The Internet, Technology, And Organized Crime. *Asian Journal Of Criminology*. 2(2), 145-161.
- Guindon, G. E., Driezen, P., Chaloupka, F. J. & Fong, G. T. (2014). Cigarette Tax Avoidance And Evasion: Findings From The International Tobacco Control Policy Evaluation (ITC) Project. *Tobacco Control*. 23, 13-22.
- Haslebacher, A. (2015). Understanding Online Carding Forums: On Products, Prices And Sellers. Doctoral Dissertation, University College London.
- Heydari, G., Tafti, S. F., Telischi, F., Joossens, L., Hosseini, M., Masjedi, M., & Ghafari, M. (2010). Prevalence Of Smuggled And Foreign Cigarette Use In Tehran. *Tobacco Control*. 19(5), 380-382.
- Holt, T. J. (2013). Exploring The Social Organisation And Structure Of Stolen Data Markets. *Global Crime*. 14(2-3), 155-174.

- Holt, T. J., Smirnova, O., & Hutchings, A. (2016). Examining Signals Of Trust In Criminal Markets Online. *Journal Of Cybersecurity*.
- Ici Radio-Canada. (2016). 60 individus liés au crime organisé arrêtés dans une opération sans précédent de la SQ.” Retrieved from <http://ici.radio-canada.ca/nouvelle/773034/surete-quebec-operation-trafiquants-drogué-tabac>.
- Interpol. (2014). Lutte Contre Le Commerce Illicite De Produits De Tabac : Guide À L'intention Des Décideurs Politiques. Retrieved from <https://www.interpol.int/fr/internet/criminalit%c3%a9/trafic-de-marchandises-illicites/assistance-juridique/publications-juridiques>.
- Jamieson, R. (1999). 'Contested Jurisdiction Border Communities' And Cross-Border Crime - The Case Of Akwesasne. *Crime, Law and Social Change*. 30(3), 259-272.
- Jha, P. & Chaloupka, F. J. (2000). The Economics Of Global Tobacco Control. *British Medical Journal*. 321(7257), 358-361.
- Joossens L., Chaloupka, F. J., Merriman, D. & Yurekli, A. (2000). Issues In Smuggling Of Tobacco Products. DANS Prabhat, J. & Chaloupka, F.J. (éds.), *Tobacco Control In Developing Countries* (pp. 393-406). London, Royaume-Uni: Oxford University Press.
- Joossens, L., Lugo, A., Lavecchia, C., Gilmore, A. B., Clancy, L., & Gallus, S. (2014). Illicit Cigarettes And Hand-Rolled Tobacco In 18 European Countries: A Cross-Sectional Survey. *Tobacco Control*. 23,17-23.
- Joossens, L., Merriman, D., Ross, H. & Raw, M. (2009). How Eliminating The Global Illicit Cigarette Trade Would Increase Tax Revenue And Save Life. Paris, International Union Against Tuberculosis And Lung Disease. Retrieved from http://global.tobaccofreekids.org/files/pdfs/en/ill_global_cig_trade_full_en.pdf.
- Joossens, L., & Raw, M. (1998). Cigarette Smuggling In Europe: Who Really Benefits? *Tobacco Control*. 7(1), 66-71.
- Joossens, L., & Raw, M. (2000). How Can Cigarette Smuggling Be Reduced? *British Medical Journal*, 321(7266), 947-950.
- Joossens, L., & Raw, M. (1995). Smuggling And Cross Border Shopping Of Tobacco In Europe. *British Medical Journal*. 310(6991), 1393-1397.
- Joossens, L., & Raw, M. (2012). From Cigarette Smuggling To Illicit Tobacco Trade. *Tobacco Control*. 21(2), 230-234.
- Joossens, L., Raw, M., & Titeca, K. (2011). Blood Cigarettes: Cigarette Smuggling And War Economies In Central And Eastern Africa. *Tobacco Control*. 20(3), 226-232.
- KPMG. (2016). Marché Illicite Du Tabac En Europe. Retrieved from <http://www.paquetneutre.com/wp-content/uploads/2015/02/project-sun-french.pdf>.
- KPMG. (2010). Project Star. Retrieved from http://www.pmi.com/eng/tobacco_regulation/illicit_trade/documents/project_star_2010_results.pdf.
- Kruithof, K., Aldridge, J., Décarry-Hétu, D., Sim, M., Dujso, E., & Hoorens, S. (2016). Internet-facilitated drugs trade. Retrieved from http://www.rand.org/content/dam/rand/pubs/research_reports/RR1600/RR1607/RAND_RR1607.pdf.
- Lalam, N., Weinberger, D., Lermenier, A. & Martineau, H. (2012). *L'Observation Du Marché Illicite De Tabac En France*. Retrieved from <http://www.ofdt.fr/bdd/publications/docs/epfxnls6.pdf>.

- Lavoie, M., & Décary-Hétu, D. (2016). BitCluster: The Bitcoin DeAnonymizer Tool. Retrieved from <https://www.bit-cluster.com>.
- LeGresley, E., Lee, K., Muggli, M. E., Patel, P., Collin, J., & Hurt, R. D. (2008). British American Tobacco And The "Insidious Impact Of Illicit Trade" In Cigarettes Across Africa. *Tobacco Control*. 17(5), 339-346.
- Lusthaus, J. (2012). Trust In The World Of Cybercrime. *Global Crime*. 13(2): 71-94.
- Maddox, A., Barratt, M. J., Allen, M., & Lenton, S. (2016). Constructive Activism In The Dark Web: Cryptomarkets And Illicit Drugs In The Digital 'Demimonde'. *Information, Communication & Society*. 19(1), 111-126.
- Martin, J. (2014). *Drugs on the Dark Net: How Cryptomarkets Are Transforming the Global Trade in Illicit Drugs*. Sydney, Australia: Palgrave MacMillan.
- Martin, J., Cunliffe, J., Décary-Hétu, D., & Aldridge, J. (2018- in press). Darknet opioids: prescription opioid scheduling and cryptomarket drug trading in the US. *British Medical Journal*.
- Moodie, C., Mackintosh, A. M., & West, R. (2010). Adolescents' Awareness Of, And Involvement With, Illicit Tobacco In The UK. *Tobacco Control*. 19(6), 521-522.
- Mann, D., & Sutton, M. (1998). NETCRIME: More Change in the Organization of Thieving. *British Journal of Criminology*. 38(2), 201-229.
- Motoyama, M., Mccoy, D., Levchenko, K., Savage, S., & Voelker, G. M. (2011). An Analysis Of Underground Forums. *Proceedings Of The 2011 ACM SIGCOMM Conference On Internet Measurement Conference*. Berlin, Germany.
- Nakamoto, S. (2009). Bitcoin: A Peer-To-Peer Electronic Cash System. Retrieved from <https://bitcoin.org/bitcoin.pdf>.
- Nasseri, R. (2015). An Investigation Of Cryptomarkets: Assessing The Online Drugs Trade From The Perspectives Of Australian Health And Law Enforcement Agencies. A thesis submitted to the Department of Policing, Intelligence and Counter Terrorism, Faculty of Arts at Macquarie University for the degree of Master of Research.
- NBC. (2011). "Schumer Calls On Feds To Shut Down Online Drug Marketplace." Online: <http://www.nbcnewyork.com/news/local/schumer-calls-on-feds-to-shut-down-online-drug-marketplace-123187958.html>.
- World Health Organization. (2003). *Convention-Cadre De L'oms Pour La Lutte Antitabac*. Online: <http://apps.who.int/iris/bitstream/10665/42812/1/9242591017.pdf>.
- World Health Organization. (2008). *Rapport De L'oms Sur L'épidémie Mondiale De Tabagisme*. Retrieved from http://apps.who.int/iris/bitstream/10665/43896/1/9789242596281_fre.pdf.
- World Health Organization. (2015). *Commerce Illicite Des Produits De Tabac. Ce Qu'il Faut Savoir Pour Y Mettre Fin*. Retrieved from http://apps.who.int/iris/bitstream/10665/176154/1/who_nmh_pnd_15.3_fre.pdf.
- World Customs Organization. (2015). *Rapport Sur Les Trafics Illicites - 2014*. Retrieved from <http://www.wcoomd.org/fr/media/newsroom/2015/december/~media/04ec82b627164a458d42db8c8a60f9e4.ashx>.
- Paquet-Clouston, & Masarah-Cynthia. (2016). Are Cryptomarkets the Future of Drug Dealing? Assessing the Structure of the Drug Market Hosted on Cryptomarkets. Masters thesis, École de criminologie, Université de Montréal.

- Peretti, K. K. (2008). Data Breaches: What The Underground World Of Carding Reveals. *Santa Clara Computer & High Tech Law Journal*. 25, 375.
- Poulsen, K. (2011). *Kingpin*. New York, USA: Crown Publishing.
- Reuter, P. (1983). *Disorganized Crime*. Boston, USA: MIT Press.
- Rhumorbarbe, D., Staehli, L., Broséus, J., Rossy, Q., & Esseiva, P. (2016). Buying Drugs On A Darknet Market: A Better Deal? Studying The Online Illicit Drug Market Through The Analysis Of Digital, Physical And Chemical Data. *Forensic Science International*, 267, 173-182.
- Ross, A. (1990). Hacking away at the counterculture. *Postmodern Culture*. 1(1).
- Shelley, L. I., & Melzer, S. A. (2008). The Nexus Of Organized Crime And Terrorism: Two Case Studies In Cigarette Smuggling. *International Journal Of Comparative And Applied Criminal Justice*. 32(1), 43-63.
- Snader, R., & Borisov, N. (2008). A Tune-Up For Tor: Improving Security And Performance In The Tor Network.
- Soska, K., & Christin, N. (2015). Measuring The Longitudinal Evolution Of The Online Anonymous Marketplace Ecosystem. *24th USENIX Security Symposium*. Washington D.C., USA.
- Soudijn, M. R., & Zegers, B. C. T. (2012). Cybercrime And Virtual Offender Convergence Settings. *Trends In Organized Crime*. 15(2-3), 111-129.
- Sydney Morning Herald. (2015). Silk Road Mastermind Ross Ulbricht Jailed For Life. Retrieved from <http://www.smh.com.au/technology/technology-news/silk-road-mastermind-ross-ulbricht-jailed-for-life-20150530-ghd1od.html>.
- Transcrime. (2013). European Outlook On The Illicit Trade In Tobacco Products. Retrieved from <http://www.transcrime.it/wp-content/uploads/2015/01/european-outlook-on-the-ittp.pdf>.
- Van Dijck, M. (2007). Cigarette Shuffle: Organising Tobacco Tax Evasion In The Netherlands. In Van Duyne, P.C., Maljevic, A., Van Dijck, M., Von Lampe, K. & Harvey, J. (eds.), *Crime Business And Crime Money In Europe*. Oisterwijk, Pays-Bas: Wolf Legal Publishers.
- Van Hout, M. C. (2015). Drugs On The Dark Net: How Cryptomarkets Are Transforming The Global Trade In Illicit Drugs. *Global Crime*. 16(3), 262-264.
- Volery, R. (2015). Vente de drogues sur les cryptomarchés : Techniques d'envoi et transmission des connaissances. Masters thesis, École des sciences criminelles, Université de Lausanne.
- Von Lampe, K. (2005). Provisional Situational Report On Trafficking In Contraband Cigarettes. Retrieved from <http://www.organized-crime.de/AOC-DLV18-vR3.pdf>.
- Wehinger, F. (2011). The Dark Net: Self-Regulation Dynamics Of Illegal Online Markets For Identities And Related Services. *Intelligence And Security Informatics Conference*. Athens, Greece.
- Yip, M., Shadbolt, N., & Webber, C. (2013). Why Forums?: An Empirical Analysis Into The Facilitating Factors Of Carding Forums.” *Proceedings Of The 5th Annual ACM Web Science Conference*. Paris, France.