2024

Postal Delivery Systems and Cryptomarkets

Trevor Lewandowski
Illinois State University, lewatrev@gmail.com

POSTAL DELIVERY SYSTEMS AND CRYPTOMARKETS

TREVOR LEWANDOWSKI

67 Pages

This thesis utilizes quantitative methods to evaluate the relationship between the level of development of state postal delivery systems and the number of drug sales originating on dark web cryptomarkets. I use data from the United Nations Universal Postal Union on state postal system operating expenditures to convey postal system development and compare it to the country-of-origin and acceptable countries-of-destination listed on cryptomarket drug postings. Previous scholars collected the cryptomarket drug postings being used from a leak on Agora from 2014-2015. This dataset contains 96,286 observations of cryptomarket-based drug transactions. This paper expected to find that moderately developed countries with moderately strong postal systems have the highest proportion of cryptomarket-based drug shipments due to a lapse in developing security measures compared to postal infrastructure. This, however, was not supported by the data which can likely be attributed to the unreliability of the available data. The findings here have potential implications for drug enforcement policy and contribute to the scholarship on drug trafficking, cryptomarkets, postal delivery systems, cybercrime, and international security.

KEYWORDS: Cryptomarkets; Drug Trafficking; State Capacity; Postal Delivery Systems

POSTAL DELIVERY SYSTEMS AND CRYPTOMARKETS

TREVOR LEWANDOWSKI

A Thesis Submitted in Partial
Fulfillment of the Requirements
for the Degree of

MASTER OF SCIENCE

Department of Politics and Government

ILLINOIS STATE UNIVERSITY

2024

POSTAL DELIVERY SYSTEMS AND CRYPTOMARKETS

TREVOR LEWANDOWSKI

COMMITTEE MEMBERS:

Michael Hendricks, Chair

Noha Shawki

Chris Brewer

CONTENTS

TABLES

CHAPTER I: INTRODUCTION

Introduction

With the proper knowledge, a person with internet access can browse illicit drug listings in minutes and order any drug they choose to be delivered to their doorstep as if they were shopping for anything else online—heroin, cocaine, methylenedioxymethamphetamine (MDMA) also known as ecstasy, high-grade marijuana, opioids, and anabolic steroids, among others.

Take the following hypothetical scenario. I plan to attend a music festival in a couple of weeks. Perhaps my friends and I are looking to score some high-grade MDMA, say 150 milligrams each; plus, one friend in the group wants to try a new strain of Sativa they heard about on Reddit and could not source locally. I grab my laptop, fire up Nord VPN to disguise my computer's IP address, and open The Onion Router (Tor) to browse drug listings on the dark web. I already have the proper encryption keys set up, as I do this several times a year. I keep some money in cryptocurrency stored safely in an offline wallet for this exact use. Monero is my choice as it is relatively stable and fully anonymous, unlike Bitcoin.

Once Tor is up and running, I am on the dark web, all from the comfort of a dorm room. My first search in Tor's address bar, similar to any other browser, is a dark web directory known as the Hidden Wiki.[1] These directories are like Wikipedia pages and serve as a repository for links. Of course, things are always changing, so it takes a try or two to find a good directory. From the directory, I scroll past the listings for fake IDs, fake passports, child sexual exploitation material, files to 3-D print lower receivers of firearms, recipes for hot sauce, and the dreaded "other" section down to the bottom where the cryptomarket listings are so I can pick one.

[1] The Hidden Wiki, "The Darknet Guide – The Hidden Wiki," Accessed 28 February 2024. https://thehiddenwiki.org/.

I usually end up only using whatever the major cryptomarket is at the time, as the top cryptomarket typically has a review system that builds legitimacy, quick shipping, and an administrator-managed escrow system. Cryptomarkets have shorter lifespans than they have had in the past in an effort to thwart law enforcement; therefore, finding the cryptomarkets I am looking for frequently takes a little longer than it used to. So-called "new cryptomarkets" that people refer to usually are just old sites with a new name and a facelift, so the end-user experience remains consistent while providing an additional step for law enforcement. Etsy-style single-seller drug stores on the dark web are another option I have considered, but they lack the recourse options of cryptomarkets, so I steer clear. While on a new cryptomarket this time, I found a vendor displaying a PGP key to confirm they are the same vendor we had previously interacted with and had a positive experience. We put 400mg of MDMA from them in our cart.

Unfortunately, the vendor we like does not sell weed, so we have to select a different vendor. This other vendor has +700 reviews and a 4.8/5-star rating, so it should be decent weed. Both orders ship from the United Kingdom and promise delivery within ten business days. I go to checkout, use the cryptocurrency I transferred from my offline wallet, and the order is complete. My friends Venmo me to square up. I decide to order the drugs directly to our dorm building since both vendors state they use stealth shipping, meaning our drugs should come vacuum-sealed and hidden within more mundane items, say bird feeders or car headlights. I close Tor, turn off my VPN, make a note in my planner to expect the delivery within two-weeks, and carry on with my night.

Upon placing the order, the vendors will receive notification through their vendor accounts on the same cryptomarket on which I placed the order, which is similar to eBay's

process.[2] For example, the vendors, say in the United Kingdom, will package their drugs securely, include a thank you note, and drop off their outgoing mail in a manner that will not draw attention. These orders will likely be packed in a clean room to prevent the vendor from accidentally placing their DNA on the package, labeled with no return address or perhaps a false one, then placed in a postal drop box. The packages will then travel by plane with millions of other packages to the United States, where they will be processed through customs. Customs can only catch so many packages, so the well-packed drugs likely reach their destination. Once I receive the package, I will confirm receipt, and the cryptomarket administrators will release the funds to the vendor. I leave positive reviews for both vendors.[3]

A crucial part of this phenomenon that is often overlooked is the postal services, whose systems cryptomarkets rely upon to operate. The main countries of origin listed in all cryptomarket transactions included in the United Nations Office on Drugs and Crime's comprehensive dataset of 294,000 drug transactions from 38 cryptomarkets operating from 2011-2021 are the United States at 29 percent, the United Kingdom at 21 percent, Germany at 13 percent, the Netherlands at 9 percent, Australia at 7 percent, and Canada at 5 percent. The United States and the United Kingdom alone account for 50 percent of global shipments, with the top 6 countries accounting for 84 percent of international shipments.[4] Regional shipping trends are

[2] Ebay, "Selling," Accessed 21 February 2024. https://www.ebay.com/help/selling.
[3] This is merely an anecdote of how a person would access the dark web and make a purchase from a cryptomarket. I personally have used VPNs and Tor to access the dark web. I have browsed various dark web directories, specific drug stores, as well as cryptomarkets so I am familiar with what a broad user experience could be. Additionally, I am an eBay seller which allows me to make comparisons between the two platforms. Alois Afilipoaie and Patrick Shortis, "From Dealership to Doorstep – How Drugs Are Sold on the Dark Net," *Global Drug Policy Observatory* (2015): 1-8; Judith Aldridge and David Décary-Hétu, "Not an 'eBay for Drugs': The Cryptomarket '*Silk Road*' as a Paradigm Shifting Criminal Innovation," *SSRN* (2014): 1-25; Monica J. Barratt and Judith Aldridge, "Everything You Always Wanted to Know About Drug Cryptomarkets* (*But Were Afraid to Ask)," *International Journal of Drug Policy* 35 (2016): 1-13.
[4] *World Drug Report 2021: Booklet 2*, 79-80.

also prevalent.[5] Fifty-seven percent of drug transactions denoted Europe – with the United Kingdom, Germany, and the Netherlands being the leaders. Thirty-four percent of drug transactions come from the Americas, with the United States, Canada, Brazil, Argentina, Mexico, and Colombia being the leaders. Australia dominates Oceania, with less than 8 percent of overall sales. In Asia, most shipments in this dataset are from China, India, Hong Kong, Singapore, Afghanistan, and Thailand, respectively, with less than 4 percent of overall sales. In Africa, most shipments originate from South Africa, Morocco, and Kenya, respectively, with less than 1 percent of overall sales.

Given the broad trends in the distribution of the countries of origin for cryptomarket-based drug transactions, as outlined above, the US and the UK clearly dominate the market. As stated above, the two are highly developed countries with robust postal systems and strong internal security measures, making up 50% of global shipments. Once expanded to the US and Europe, the number jumps to 86% of global shipments. Drug consumers from these two countries and the Global North drive the demand for drugs. So, while on the surface, the US and the UK reign supreme for shipments, these countries also have strong internal security measures that catch shipments, sizeable populations compared to other countries of the Global North, and rank 15th and 37th in GDP per capita, respectively.[6] Therefore, while the US and UK appear dominant outright, proportionately, other countries may ship out more drugs originating from cryptomarket-based transactions, controlling for other explanations.

Cryptomarkets themselves are not often overlooked as a component of international drug trafficking, but the success of vendors in specific countries is. Specifically, what accounts for the

[5] For a visual representation of the distribution of drug shipments originating from cryptomarkets sorted by region and country of origin, see figure 50 in *World Drug Report 2021: Booklet 2*, 81.
[6] Central Intelligence Agency, "World Fact Book: Real GDP Per Capita," Accessed 29 April 2023. https://www.cia.gov/the-world-factbook/field/real-gdp-per-capita/country-comparison.

distribution of illicit drug shipments originating in larger quantities from one country compared to another?

I argue that in countries with moderately developed postal systems, the highest proportion of drugs passes through that postal system. This is because the postal systems are not yet developed enough to implement high-level security measures, creating a theoretical sweet spot, allowing cryptomarket vendors to thrive in these countries. I also argue that in countries with strong postal systems, only a moderate number of drugs pass through the mail as security measures kick in once a nation – and, therefore, its postal system – reaches a certain point of development. Lastly, countries with weak postal systems have the lowest number of transactions originating from within them as they cannot handle the same number of letters and packages as the postal systems in further stages of development, regardless of security measures.

The following chapter contains the necessary background information to convey drug trafficking as a culmination of threats to international security, the technology and norms that enable the existence of cryptomarkets, and the postal delivery systems that facilitate drug deliveries. In Chapter 3, I further explore the topic with a literature review that conveys the lack of attention paid to the role of postal delivery systems among scholars who study cryptomarkets. Chapter 4 develops my theory and hypothesis, situated in the state capacity literature, explaining how postal delivery systems enable cryptomarkets. Specifically, I outline the hypothesized relationships between the *Level of Development, or Strength, of a Country's Postal Delivery System* and the *number of Illicit Drug Shipments by Country/Region of Origin.* Next, in Chapter 5, I further define my research design and methods. Finally, in Chapter 6, I will discuss the results of the quantitative analysis and conclude with the limitations and broader implications of this research.

CHAPTER II: BACKGROUND

Cryptomarkets Defined

Cryptomarkets are illicit online marketplaces hosted on the dark web where vendors and buyers[7] can conduct fully anonymized illicit drug transactions, vet each other through a peer review system, send/receive payment through a cryptocurrency escrow system, and ship/receive their drugs through postal delivery systems.[8] These transactions are made possible by merging anonymizing "onion" networks, end-to-end encryption, and cryptocurrency. Cryptomarket is interchangeable with the terms Dark Net Market (DNM)[9], dark web marketplace/market[10], and online drug marketplace/market.[11] However, the term "Dark Net Market" is often used in passing by researchers focusing on the dark web in general, and "illicit online marketplace" is a less common term that is more of a description. In addition, other one-off terms, such as "Illicit E-Commerce Market," are occasionally used. Still, there is no justification for terms like this as they fracture the scholarship and offer no clear benefit over the term cryptomarket.[12] Therefore,

---

[7] Throughout this paper the terms "vendor" and "seller" are used interchangeably when writing about those who sell items on cryptomarkets. Additionally, "buyer "is the term of choice for those who order items off cryptomarkets over the term "consumer" in most cases as one cannot be certain if a person buying drugs on a cryptomarket intends to consume them. There are also more items for sale on cryptomarkets than drugs making the term "buyer" more generalizable. Lastly, "buyer" is the term of choice when on the subject of drug use as the term "user" is often perceived to have a negative connotation.

[8] For more on Cryptomarkets see Aldridge and Décary-Hétu. "Not an 'eBay for Drugs,'" 1-25; Aldridge and Décary-Hétu, "Hidden Wholesale," 7-15; Aldridge and Askew, "Delivery Dilemmas," 101-109; Barratt and Aldridge, "Everything You Always Wanted to Know About Drug Cryptomarkets," 1-13; Afilipoaie and Shortis, "From Dealership to Doorstep," 4-7; Barratt, Ferris, and Winstock, "Safer Scoring?" 24-31; Demant, Munksgaard, and Houborg, "Personal Use, Social Supply or Redistribution?" 42-61; Van Buskirk, Naicker, Roxburgh, Bruno, and Burns, "Who Sells What?"16-23; Zhengyi Li, Xiangyu Du, Xiaoqian Jiang, and Tiffany Champagne-Langabeer, "Demystifying the Dark Web Opioid Trade: Content Analysis on Anonymous Market Listings and Forum Posts," *Journal of Medical Internet Research* 23, no. 2 (2021): 1-16.

[9] For more on Dark Net Markets see Damien, Ludovic, Julian, Quentin, and Pierre, "Buying Drugs on a Darknet Market: A Better Deal?" 11-13; Espinosa, "Scamming and the Reputation of Drug Dealers on Darknet Markets," 1-49; Heidenreich and Westbrooks, "Darknet Markets," 38-44.

[10] For more on dark web marketplaces see Gehl, *Weaving the Dark Web*, 92-94.

[11] For more on online drug markets see Barratt, Ferris, and Winstock, "Use of Silk Road, the Online Drug Marketplace, in the UK, Australia, and the USA," 774-783; Munksgaard, Ferris, Winstock, Maier, and Barratt, "Better Bang for the Buck? Generalizing Trust in Online Drug Markets," 1-17.

[12] Isak Ladegaard, "Instantly Hooked? Freebies and Samples of Opioids, Cannabis, MDMA, and Other Drugs in an Illicit E-Commerce Market," *Journal of Drug Issues* 48, no. 2 (2017): 226-245.

"cryptomarket" is the term of choice for this project as it is concise and the most used in the relevant literature. Furthermore, it can be used synonymously with the alternative terms, is operationalizable, fully encompasses the concept's attributes, and is sufficient for field and theoretical use.

Traditional and Illicit Online Drug Trafficking

"Illicit online drug trafficking" is defined for this project as drug trafficking facilitated through cryptomarkets. Other methods of illicit online drug trafficking unrelated to cryptomarkets include local transactions facilitated through social media platforms like Snapchat and Instagram, which still require physical contact between a dealer and buyer upon delivery. Furthermore, transactions via private password-protected marketplaces on both the clear and dark web are a part of drug trafficking. Still, these stores are small in scale and exclusive to certain groups of people that researchers cannot access. While these methods of sale play into drug trafficking as a whole, the focus of this project is cryptomarkets. Therefore, "illicit online drug trafficking" is the term of choice for this project. It is the most operationalizable, pinpointing the desired concept's attributes, and sufficient for both field and theoretical use.[13]

Cryptomarkets are consistent with the broader principles of drug trafficking. Drug trafficking is a unique component of the illicit international economy as drugs can quickly move across borders, and there is a high profit margin compared to illegal timber or oil.[14] Drug trafficking also has a uniquely high level of resiliency. Three critical dynamics created by the

[13] James Martin, Jack Cunliffe, David Décary-Hétu, and Judith Aldridge, "Effect of Restricting the Legal Supply of Prescription Opioids on Buying through Online Illicit Marketplaces: Interrupted Time Series Analysis," *Research* (2018): 1-5.
[14] Paul Rexton Kan, *Drug Trafficking and International Security*, Lanham: Rowman & Littlefield, 2016, 2.

global drug prohibition regime account for this resiliency: the "profit paradox," the "balloon effect," and the "hydra effect."[15]

The profit paradox concerns the sheer amount of profit that can be made from drug trafficking, which continually pulls people into trafficking over less profitable lines of work.[16] Next, the balloon effect is much like if a person were to hold an unpoppable balloon in their hands, wherein when squeezed, the air will not disappear but merely move to another location within the balloon. Therefore, when law enforcement entities attempt to squeeze drugs out of a specific physical area, the drugs shift elsewhere, and do not disappear.[17] The balloon effect is especially relevant in the cryptomarket discussion because illicit drug sales can transfer to the dark web if squeezed out of a physical area. Additionally, suppose one thinks of the dark web as a closed system when law enforcement shuts down one cryptomarket. In that case, it is reasonable to expect the drug transactions to move to a different cryptomarket. Lastly, the hydra effect is when law enforcement apprehends or kills a dealer, distributor, manufacturer, or other person employed by the illicit drug industry. There will always be two more people to take their place, just like cutting the heads off the Greek mythical monster the hydra. The same goes for whenever law enforcement shuts down one cryptomarket, there is a fracture in the business, and two more cryptomarkets emerge to fill the void.

Furthermore, the driving factors of innovation in drug trafficking are technology, attitudes, and organization, which are relevant to cryptomarkets. These factors led to the

---

[15] Kan, *Drug Trafficking and International Security*, 12-14.

[16] This is in line with prior research in criminal psychology, particularly Mertonian strain theory, where it is argued that societal structures, in this case extrinsic motivation for increased wealth, pressure individuals to commit crimes. See Encyclopedia Britanica, "Strain Theory," Accessed September 15, 2023, https://www.britannica.com/topic/victimology for more information.

[17] This is a unique aspect of crime displacement theory in criminology only being supported for certain types of crime, much of which can be prevented through target hardening and policing hot spots. Drug trafficking and cryptomarkets are particularly resilient against these strategies. See Bosman, Sarah. "Mythbuster: Does Crime Prevented Mean Crime Displaced?" European Crime Prevention Network (2022): 1-9 for more information.

emergence and sustained success of cryptomarkets. Technological innovations directly relate to the manufacture and distribution of drugs, attitudes lead to changing regulations in the global drug prohibition regime, and the organizational structure of traffickers relates to how different platforms facilitate the illicit online sale of drugs.[18] These factors and phenomena make drug trafficking challenging to combat, even more so online.

Illicit Online Drug Sales, Silk Road, and the Enabling Technology

The dark web is best explained using the analogy of an iceberg partially submerged in a body of water. The entire iceberg is the internet, an infrastructure built on standardized data transfers and digital exchange. The clear web – also known as the surface web – is the regular part of the internet comprised of search engines that are publicly accessible. This is the tip of the iceberg visible from above the water. The deep web is the vast majority of the iceberg that is out of sight, under the water. It consists of many everyday things like email, online school accounts, and online banking. Finally, the dark web, a tiny fraction of the underwater part of the iceberg representing the deep web, is where cryptomarkets and other hidden platforms that users can only access through special anonymizing networks exist.[19]

While many cryptomarkets have come and gone, the former Silk Road is the foremost example of a cryptomarket. Named after the ancient Eurasian trading route, the Silk Road went live in early 2011. It was by no means the first platform for illicit online drug sales, as online drug sales have been occurring since the late 1990s. Still, the early online drug trafficking operations had been primitive and unreliable.[20] Silk Road was the first well-organized site to

[18] Kan, *Drug Trafficking and International Security*, 22-24.
[19] UNODC, "World Drug Report 2021: Booklet 1," 25.
[20] Eileen Ormsby, *Silk Road* (Sydney: Pan Macmillan Australia, 2014), 15-18. See Ormsby for the full story of the rise and fall of the original *Silk Road* site from the perspective of an investigative journalist who followed the developments in real-time.

commercialize illegal dark web activities. By providing a system of trust and exceptional customer service that made it stand out from its competitors, it grossed 62.3 million dollars in sales during its relatively short lifespan.[21] However, one cannot simply run an illicit drug empire on the regular internet using Google Chrome, unencrypted communications, and credit cards. This would be putting out the welcome mat for law enforcement. Silk Road could never have been created if not for the merging of three vital online technologies – anonymizing networks, end-to-end encryption, and cryptocurrency – that, when combined, created the perfect virtual environment for Silk Road and other cryptomarkets to blossom and thrive.[22]

Anonymizing Networks

The first technology that makes a cryptomarket possible is anonymizing networks such as The Onion Router (Tor), the Invisible Internet Project (I2P), and Freenet. These easily downloadable open-source programs enable anonymous web browsing by masking the user's internet protocol address (commonly known as IP address) and geographical location. These programs are the gateway to the dark web and all the associated sites that are inaccessible via regular internet browsers.[23] Tor is the foremost anonymizing network used to access the dark web. It was initially developed as a secure communications network with significant funding from the US and Norwegian militaries. While neither military relies on the technology now, Tor is legitimately used to circumnavigate censorship laws in oppressive states and by internet users who wish to remain fully anonymous for their own reasons.[24] Furthermore, cryptomarkets that run on Tor do not get shut down as the TorGroup that owns and administers the platform views

[21] Ormsby, *Silk Road*, 16; UNODC, *World Drug Report 2021: Booklet 2*, 79.
[22] For visuals on the lifespans and profitability of the top 19 dark markets past and present from January of 2011 to January of 2021 see figures 46 and 47 in UNODC, *World Drug Report 2021: Booklet 2*, 78-79.
[23] Ormsby, *Silk Road*, 17; Robert W. Gehl, *Weaving the Dark Web: Legitimacy on Freenet, Tor, and I2P* (Cambridge: The MIT Press, 2018), 5-6.
[24] Ormsby, *Silk Road*, 28-29; Tobias Feakin, "Cryptomarkets: Illicit Goods on the Darknet." *Australian Strategic Policy Institute: The Strategist*, November 6, 2014.

the network as one big open platform for free speech. Therefore, the TorGroup has no desire to regulate Tor as this would compromise the idea of the open-source anonymizing network.[25]

End-to-End Encryption

The second technology that makes cryptomarkets possible is Pretty-Good-Privacy (PGP) encryption, which is a form of end-to-end keypair-based encryption that scrambles communications between two or more parties, allowing only the intended recipient(s) who hold private encryption keys to read the message.[26] Anyone who intercepts messages between parties using PGP encryption – mainly law enforcement – could only see an unintelligible mix of letters, numbers, and symbols without the necessary digital key.[27] This technology is frequently implemented by dark web users, especially those who participate in the illicit online sale of drugs, to protect their information from the outside world while carrying out illegal transactions. Through the unique features of PGP, dark web users can use their anonymized keys as an additional level of security. The display of a PGP key indicator allows a person to exhibit their control over the technology and confirm their online identity to ensure other users are engaging with the same person across multiple interactions while maintaining overall anonymity.[28]

Cryptocurrency

Bitcoin was the third technology that allowed the cryptomarket system to come together. This fully transferable online currency knows no borders and requires no identification to transfer. Bitcoin, and later other cryptocurrencies, became the method of payment used on the Silk Road and later on other cryptomarkets.[29] Bitcoin's founder, known only by the pseudonym

[25] Ormsby, *Silk Road*, 29-30.
[26] For a full accounting of the cryptographic origins of public and private keys see Steven Levy, *Crypto: How the Code Rebels Beat the Government – Saving Privacy in the Digital Age*, (New York: Penguin Group, 2001).
[27] Ormsby, *Silk Road*, 17.
[28] Gehl, *Weaving the Dark Web*, 92.
[29] Ormsby, *Silk Road*, 17.

Satoshi Nakamoto, created Bitcoin as a secure and freely traded currency without interference from banking and governmental institutions. He achieved this goal.[30] Tor and PGP encryption were existing technologies before Silk Road, but Bitcoin was developed immediately before Silk Road, enabling it and cryptomarkets to function and flourish. In the early years of Bitcoin, few sectors of commerce were willing to use digital currency with no governmental backing. However, Bitcoin found footing in the cryptomarkets that developed around it and welcomed it with open arms. Cryptomarkets later began accepting other emerging forms of cryptocurrency.[31] Up until 2012, the price of Bitcoin was directly dependent on the stability of the Silk Road. Still, after 2012, Bitcoin became increasingly independent as legitimate markets began trading in cryptocurrency, too.[32]

Exchanges of Bitcoin exchanges are not 100% anonymous as the possession of Bitcoin can be tracked from one digital wallet to the next, even if the owner's identity is unknown. To solve this issue and fully anonymize Bitcoin and other cryptocurrencies, "tumbling" services have become available to cater to those who wish to launder their cryptocurrency and remain untraceable in their transactions. So-called tumbling services mix and redistribute legally and illegally acquired cryptocurrency to disaffiliate the identification information attached to each coin.[33]

Other forms of cryptocurrency include Ethereum, Dash, Litecoin, Zcash, Monero, and countless others. Despite not being as well established, several alternative cryptocurrencies may appeal more to dark web users than Bitcoin. For example, Monero is designed to provide fully

[30] Ormsby, *Silk Road*, 38-40.
[31] Ormsby, *Silk Road*, 43.
[32] Ormsby, *Silk Road*, 172.
[33] Richet, Jean-Loup Richet, "Laundering Money Online: A Review of Cybercriminals' Methods," *Tools and Resources for Anti-Corruption Knowledge – United Nations Office on Drugs and Crime* (2013), 1-19: Wolfgang Karl Hardle, Campbell R. Harvey, and Raphael C. G. Reule, "Understanding Cryptocurrencies," *Journal of Financial Econometrics* 18, no. 2 (2020): 181–208.

anonymous exchanges that cannot be traced from digital wallet to digital wallet, negating the need to use any cryptocurrency tumbling service.[34] Yet, Bitcoin is still the most stable and reputable despite not being entirely anonymous.[35]

Other Dynamics and Recent Developments

News of the Silk Road's existence and unique business endeavors initially spread on clear web online forums such as Reddit, where it developed a small, close-knit consumer base. However, the site eventually gained media attention in mid-2011, putting it on the radar of policymakers, law enforcement, and a bounty of new buyers.[36] Today, promoting the dark web on the clear web is still significant in drawing users to the dark web. Places like the dark web subreddit (r/darknet) contain information such as how-to guides for all the technology needed to access the dark web, including ratings, reviews, and a community of people who already utilize the technology.[37] Additionally, once users access the dark web, they can easily find so-called dark web directories that list various sites and services users can access, including cryptomarkets and private vendors with their own stores.[38]

The Silk Road's usage of the tried-and-true technologies of Tor, PGP, and its early adoption of Bitcoin made it successful, but what made Silk Road stand apart from the competition was safety, security, and community, which current cryptomarkets continue to embrace. For example, the Silk Road had an escrow system that allowed administrators to act as independent brokers, withholding the buyer's funds from the vendor until the buyer received the

[34] Gehl, *Weaving the Dark Web*, 92; Europol, "Internet Organised [sic] Crime Threat Assessment (IOCTA)," *European Union Agency for Law Enforcement Cooperation*, 2020, 58.
[35] For a deeper understanding of cryptocurrency, see Wolfgang Karl Hardle, Campbell R. Harvey, and Raphael C. G. Reule, "Understanding Cryptocurrencies," *Journal of Financial Econometrics* 18, no. 2 (2020): 181–208.
[36] Ormsby, *Silk Road*, 53, 61-65.
[37] Gehl, *Weaving the Dark Web*, 93.
[38] A helpful comparison is to think of eBay as a cryptomarket equivalent, in contrast to Etsy as an induvial online store equivalent.

product from the vendor. Upon receipt of goods, the buyer would instruct the administrators to release the funds to the vendor. In addition to its escrow system, Silk Road also instituted a feedback system that allowed vendors and buyers to rate each other, thereby allowing Silk Road users – vendors and buyers – to build a reputation.[39] This is the same system eBay uses, plus a variety of subreddits where individuals buy and sell goods such as firearm accessories.[40] These two systems worked in unison to prevent scams, incentivize good customer service, and ensure the sale of high-quality drugs, shaping Silk Road into the well-curated online drug-oriented black market it would become.[41]

Postal Delivery Systems

The phrase "postal delivery systems" is defined for this project as the combination of state and privately owned mail services in a given country or region that constitute a nationwide and/or global communications network that provides the consistent and secure delivery of mail, packages, and other communications for businesses, governments, and the general public alike.[42] Postal services also spread knowledge, aid in the quick procurement of intellectual property rights, foster commerce, and facilitate the spreading of information and goods.[43] Additionally, drawing from the state capacity literature, postal services are often used to measure a country's political and economic life. They indicate state development and functionality as they are

[39] There has been evidence in a case study of the cryptomarket Hansa that vendors who have a positive "e-reputation" can successfully charge more for their products than vendors who do not have the same reputation. Romain Espinosa, "Scamming and the Reputation of Drug Dealers on Darknet Markets," *International Journal of Industrial Organization* 67 (2019): 27.
[40] See the rules of https://www.reddit.com/r/GunAccessoriesForSale/ for a clear web example of how a community-based marketplace is run.
[41] Ormsby, *Silk Road*, 17.
[42] Gehl, *Weaving the Dark Web*, 92-94; "About the United States Postal Service," United States Postal Service, Accessed September 30, 2022, https://about.usps.com/who/profile/.
[43] Daron Acemoglu, Jacob Moscona, and James A. Robinson, "State Capacity and American Technology: Evidence from the Nineteenth Century," *American Economic Review* 106, no. 5 (2016): 61; Jon C. Rogowski, John Gerring, Matthew Maguire, and Lee Cojocaru, "Public Infrastructure and Economic Development: Evidence from Postal Systems, *American Journal of Political Science* 0, no. 00 (2021): 2.

considered core infrastructure, adding to their relevance in international relations.[44] The chosen term is concise and familiar to all audiences.

Postal delivery systems are the principal component that enables illicit online drug trafficking. Without postal delivery systems, personal drug shipments would not be able to move from point A to point B in a manner that was cost-effective and efficient enough to build drug empires upon, whether that be small quantities of drugs in traditional letter-sized envelopes, nondescript packages, or drugs concealed within larger items to evade detection.[45] Yet, there is little scholarship within the drug trafficking literature on postal delivery systems. When examined, scholars mention postal systems in passing as something that facilitates the online sale of drugs, but nothing more.[46] However, these delivery systems play a more critical role in illicit online drug trafficking than previously thought.

A postal delivery system has four key phases: an item entering the mail, shipment, screening, and delivery. After buyers purchase their desired drugs on the dark web, their items must physically be entered into the postal delivery system by the vendor or a proxy working for the vendor. This is most commonly done by a vendor paying postage online and then dropping the pre-paid package off at a postal drop-box to avoid face-to-face interactions with postal workers. Vendors also take additional steps to conceal the contents of the package and their own

[44] Jeffery L. Jensen an Adam J. Ramey, "Going Postal: State Capacity and Violent Dispute Resolution," *SSRN* (2019): 3; Vincent Geloso and Michael Makovi, "State Capacity and the Post Office: Evidence from Nineteenth Century Quebec." *Journal of Government and Economics* 5 (2022): 1-18; Daron Acemoglu, Jacob Moscona, and James A. Robinson, "State Capacity and American Technology: Evidence from the Nineteenth Century," The American Economic Review 106, no. 5 (2016): 61-67; Tahir Andrabi, Sheetal Bharat, and Michael Kuehlwein, "Post Offices and British Indian Grain Price Conversion," *Economic History of Developing Regions* 35, no. 1 (2020): 23-49; Alberto Chong, Rafael La Porta, Florencio Lopez-de-Silanes, and Andrei Shfeifer. "Letter Grading Government Efficiency," *Journal of the European Economic Association* 12, no. 2 (2014): 277-298.
[45] United Nations Office on Drugs and Crime, *World Drug Report 2021: Booklet 2: Global Overview: Drug Demand and Drug Supply* (2021), 75; Gehl, *Weaving the Dark Web*, 93-94.
[46] Gehl, *Weaving the Dark Web*, 93-94; Monica J. Barratt and Judith Aldridge, "Everything You Always Wanted to Know About Drug Cryptomarkets* (*But Were Afraid to Ask)," *International Journal of Drug Policy* 35 (2016): 2; Afilipoaie and Shortis, "From Dealership to Doorstep," 4-7.

identity from law enforcement. For example, vendors package their products in cleanrooms to prevent DNA contamination, wear gloves when dropping off items, use false or no return addresses, utilize various postal services, and drop packages off at different locations irregularly to avoid creating patterns and, therefore, detection.[47]

Regarding the actual shipment, a package must go through customs if it is international; otherwise, it will immediately travel via a combination of plane, train, truck, car, ship, and/or feet to its destination. The destination where the buyer receives their drugs could be an anonymous drop-box, the front desk at a postal office, their place of residence, or even a neutral location such as a vacant house across the street that the buyer can monitor.

Of course, postal services know that illicit items such as drugs pass through the mail and are delivered via their services. Still, there is no concrete way to increase interception without increasing delivery times, pushing search and seizure limitations, and significantly increasing the number of agents and equipment necessary to monitor packages. Hence, these shipments, for the most part, go unchecked. It is also important to note that state postal systems, such as the United States Postal Service, experience the majority of drug shipments due to their wider service areas, speed of delivery, and offering the best prices for shipping small packages.[48]

John F. Kennedy (JFK) International Airport provides an example of mail screening operations conducted by US Customs and Border Patrol (CBP), which screens for certain foods,

---

[47] Afilipoaie and Shortis, "From Dealership to Doorstep," 4-7; Aldridge and Askew, "Delivery Dilemmas," 101-109; Rhumorbarbe Damien, Staehli Ludovic, Broséus Julian, Rossy Quentin and Esseiva Pierre, "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* (2016): 11-13.

[48] United States Postal Service Office of the Inspector General, "Audit Report: Use of Postal Service Network to Facilitate Illicit Drug Distribution," September 28, 2018; 6-11; Joe Davidson, "Postal Service – The Preferred Shipper for Drug Dealers," *The Washington Post.* October 16, 2018; https://www.washingtonpost.com/politics/2018/10/16/postal-service-preferred-shipper-drug-dealers/; Justin Rohrlich, "Drug Traffickers' Favorite Way to Move Fentanyl is FedEx and USPS." *Quartz*. May 30, 2019. https://qz.com/1627572/drug-traffickers-favorite-way-to-move-fentanyl-is-fedex-and-usps.

animals, firearms, explosives, chemicals, drugs, and other items. JFK is one of nine international mail facilities in the United States and handles 60% of all international packages entering the country, with over one million international packages arriving daily. CBP utilizes a three-tiered strategy to search packages: intelligence gathering, nonintrusive inspection, and hand inspection. During in-processing, packages run along large conveyor belts destined for screening by X-ray machines. Additionally, CBP dogs run along the conveyor belts, sniffing for drugs, cash, and explosives. Suppose an agent sees something on an X-ray, a dog alert, or there is intelligence from another agency that an individual is shipping something illegal. In that case, CBP agents conduct a hand search by carefully cutting open, searching, and either resealing packages or seizing their contents.[49]

Conclusion

This chapter has covered the operations and implications of cryptomarkets, ranging from scenarios of how one buys drugs through a cryptomarket, the path of those drugs to their destination, the attempts of governments to limit these shipments, and how illicit online drug trafficking falls into drug trafficking as a whole. Next will be a literature review that covers studies on the capabilities of the technology that enables cryptomarkets, trends in cryptomarket lifespans and use, and implications for drug trafficking as a whole, beginning with the scholarship that came about immediately after the fall of the first cryptomarket, Silk Road.

[49] Abby Narishkin and Steve Cannon, How JFK Customs Searches 1 Million Packages a Day for Illegal Items," *Business Insider,* March 23, 2021. https://www.businessinsider.com/jfk-customs-searches-million-mail-packages-drugs-counterfeit-2019-9.

CHAPTER III: LITERATURE REVIEW

Silk Road Scholarship

Following the FBI's arrest of the founder/administrator of Silk Road and the site's closure in October 2013, the scholarship on illicit online drug trafficking via cryptomarkets has boomed. As a result, a growing body of literature has examined how and why cryptomarkets thrive. The current scholarship on cryptomarkets focuses on why people elect to purchase drugs online rather than in-person, the role of cryptomarkets in drug trafficking as a whole, case studies on what has contributed to the popularity of cryptomarkets in specific regions, and the operations of illicit online drug vendors and the services that support them.

Scholars have conducted quantitative studies in the United States, United Kingdom, and Australia on the use of the original Silk Road. This has enabled them to understand the level of familiarity survey respondents had specifically with Silk Road, the site's use by different demographic groups, and why people opt to purchase their drugs through the dark web rather than in person. However, research on other cryptomarkets is limited, and scholars have primarily used the Silk Road due to its notoriety and name recognition.[50]

Cryptomarkets and International Drug Trafficking

Regarding the role of cryptomarkets in international drug trafficking, researchers have argued that there are more business-to-business transactions between drug dealers in these markets than previously thought.[51] Scholars have also argued that cryptomarkets have broader implications as these marketplaces are equally threatening as traditional drug trafficking to

[50] Monica J. Barratt, Jason A, Ferris, and Adam R. Winstock, "Use of Silk Road, the Online Drug Marketplace, in the UK, Australia, and the USA," *Addiction* 109, no. 5 (2013): 774-783; Atte Oksanen et al., "Social Media and Access to Drugs Online: A Nationwide Study in the United States and Spain among Adolescents and Young Adults," *The European Journal of Psychology Applied to Legal Context* 13, no. 1 (2021): 29-30.
[51] Judith Aldridge and David Décary-Hétu. "Not an 'eBay for Drugs': The Cryptomarket 'Silk Road' as a Paradigm Shifting Criminal Innovation," *SSRN* (2014): 1-25.

international security. This is because the drugs are likely sourced from the same origins regardless of how they are sold. Therefore, cryptomarkets still indirectly fund the criminal and terrorist organizations that control the early stages of drug production and trafficking.

Case studies investigate waves of dark web interest among the general population, such as the wave that followed the boom and bust of the original Silk Road, leading up to the establishment of the cryptomarket Silk Road 2.0. In addition, some waves of popularity and sales increase on cryptomarkets show a correlation with the expansion of internet access regions, such as in Australia's case.[52] Researchers have also conducted case studies to investigate how the listings of illicit substances were distributed by country on the largest cryptomarkets at the time and the trends of substance sales in each country.[53]

Vendor Operations

The motivations and operations of cryptomarket vendors are also of interest to many scholars. Topics of interest relating to these vendors include whether vendors source their stock through in-person street-level transactions or buy in bulk on the same cryptomarkets where they sell their products.[54] There is also support for the idea that the culture of cryptomarkets fosters trust and how this trust enables consumers to overcome quality concerns about the products they buy. Compared to offline/traditional drug transactions, there is evidence that cryptomarket users trust their vendors more than those who purchase drugs from dealers in person.[55] Scholars also

[52] Amy Phelps and Alan Watt, "I Shop Online – Recreationally! Internet Anonymity and Silk Road Enabling Drug Use in Australia," *Digital Investigation* 11, no. 4 (2014): 261-272.
[53] Joe Van Buskirk, Sundresan Naicker, Amanda Roxburgh, Raimondo Bruno, and Lucinda Burns, "Who Sells What? Country Specific Differences in Substance Availability on the Agora Cryptomarket," *International Journal of Drug Policy* 35 (2016): 16-23.
[54] Alois Afilipoaie and Patrick Shortis, "From Dealership to Doorstep – How drugs Are Sold on the Dark Net," *Global Drug Policy Observatory* (2015), 4-7.
[55] Rasmus Munksgaard, Jason A. Ferris, Adam Winstock, Larissa J. Maier, and Monica J. Barratt, "Better Bang for the Buck? Generalizing Trust in Online Drug Markets," *The British Journal of Criminology* XX (2022): 1-3,16-17.

note that buying and selling drugs from the comfort of your home may attract new vendors and buyers due to the perceived and lower risk of threats and violence.[56]

Additionally, some researchers argue that the diffusion of drugs bought by cryptomarkets occurs through lower-level dealers sourcing their products online and then selling that same product in traditional/offline street-level sales. Hence, drugs acquired on the dark web can spread to those not directly involved with the dark web themselves.[57] Scholars have also used online forums attached to specific cryptomarkets to gather information on how cryptomarket users mitigate risk, as viewed by those who participate in the activities, be it when dropping off packages containing drugs to be mailed, tactics for disguising drugs in the mail, or how to avoid a controlled delivery by law enforcement.[58] Hybrid drug markets hosted partially on the dark web are another more recent phenomenon. Platforms such as Televend are not technically cryptomarkets but share similar operating procedures, making the anonymity achieved on the dark web more approachable to the average person by running transactions through Telegram's messaging app.[59]

Concerning vendors' operations, there is also a body of scholarship on online money laundering and the other online technologies that cryptomarket users utilize, given that not all cryptocurrencies are equally anonymous. The research on this includes micro-laundering through

---

[56] Sarah Heidenreich and Dennis A. Westbrooks II, "Darknet Markets: A Modern Day Enigma for Law Enforcement and the Intelligence Community," *American Intelligence Journal* 34, no. 1 (2017): 38-44; James Martin, Rasmus Munksgaard, Ross Coomber, Jakob Demant, and Monica J. Barratt, "Selling Drugs on Darkweb Cryptomarkets: Differentiated Pathways, Risks and Rewards," *The British Journal of Criminology* 60, no. 3 (2019): 559-575; Monica J. Barratt, Jason A. Ferris, and Adam R. Winstock, "Safer Scoring? Cryptomarkets, Social Supply and Drug Market Violence," *International Journal of Drug Policy* 34 (2016): 24-31.
[57] Judith Aldridge and David Décary-Hétu, "Hidden Wholesale: The Drug Diffusing Capacity of Online Drug Cryptomarkets," *International Journal of Drug Policy* 35 (2016): 7-15; Jakob Demant, Rasmus Munksgaard, and Esben Houborg, "Personal Use, Social Supply or Redistribution? Cryptomarket Demand on Silk Road 2 and Agora," *Trends in Organized Crime* 21 (2018): 42-61.
[58] Judith Aldridge and Rebecca Askew, "Delivery Dilemmas: How Drug Cryptomarket Users Identify and Seek to Reduce Their Risk of Detection by Law Enforcement," *International Journal of Drug Policy* 41 (2017): 101-109.
[59] Monica J. Barrat et al, "Exploring Televend, an Innovative Combination of Cryptomarket and Messaging App Technologies for Trading Prohibited Drugs," *Drug and Alcohol Dependence* 231 (2022): 1-6.

mobile payment services (including but not limited to Zelle, Venmo, PayPal, and Cash App) and laundering money through online gaming sites using in-game currency and scamming unsuspecting individuals into giving launderers access to their personal accounts, which are subsequently used as mules.[60]

A recent development on the dark web, as identified in Europol's 2020 Internet Organized Crime Threat Assessment (IOCTA), is that there has been a decrease in large-scale cryptomarkets and an increase in small-scale ones that sometimes serve more specialized groups of customers.[61] This fragmentation of illicit online drug sales poses a challenge for law enforcement as there is no primary target to focus on like the Silk Road, Dream Market, or Alphabay. For example, law enforcement shut down Alphabay in 2017, with almost 18 times as many listings as the Silk Road, grossing 222.3 million dollars in sales throughout its life.[62] Another factor with small-scale cryptomarkets, besides being more specialized, is that some marketplaces have intentionally short lifespans to evade law enforcement. As a result, law enforcement action usually takes too long to target and shut down a cryptomarket before it adapts and moves.

Moreover, there are other channels where drugs are sold online. These channels include social media platforms like Snapchat, private password-protected marketplaces on both the clear and dark webs, and the sale of not yet classified or illegal psychoactive intoxicating substances on the clear and dark webs.[63] While these methods of online drug trafficking contribute to the

[60] Jean-Loup Richet, "Laundering Money Online: A Review of Cybercriminals' Methods," *Tools and Resources for Anti-Corruption Knowledge – United Nations Office on Drugs and Crime* (2013), 1-19.
[61] Europol, "IOCTA," 56.
[62] United States Department of Justice: Office of Public Affairs, "AlphaBay, the Largest Online 'Dark Market,' Shut Down," *Justice News*, July 20, 2017; UNODC, *World Drug Report 2021: Booklet 2*, 79.
[63] UNODC, *World Drug Report 2021: Booklet 2*, 77-79.

same larger issues as cryptomarkets, given the private nature of the transactions, there is a lack of data to conduct quantitative research on these interactions compared to cryptomarkets.

Data Collection and Recent Developments

When working with the internet as a whole – more so with the dark web than the clear web – the methods of data collection and the ethics and usage of any collected data must be discussed and have been in the previous literature. Dark web data can be collected in several ways. Scholars can use Python or comparable software programs to collect cryptomarket data automatically. This process is often called web crawling or scraping, and it gathers all the data one can see in a cryptomarket drug listing, but it is automated so that it can be done efficiently on a large scale. The other way that scholars gain access to dark web data is through the hacker community. While scholars are not directly involved in hacking cryptomarkets to acquire their data, large dumps of cryptomarket data occasionally become available through hacking/blackmail schemes, which brings the ethics of data usage into consideration for those datasets.[64]

Scholars also promote the concept of Cyber Threat Intelligence (CTI), which can be defined as "the process of identifying an emerging threat and key actors (e.g., hackers) to enable

[64] Zhang Du, Ning Po-Yi, Mohammedreza Ebrahimi, Sagar Samtani, Ben Lazarine, Nolan Arnold, Rachael Dunn, Suntwal Sandeep, Guadalupe Angeles, Robert Schweitzer, and Hsinchun Chen, "Identifying, Collecting, and Presenting Hacker Community Data: Forums, IRC, Carding Shops, and DNMs," *Institute of Electrical and Electronics Engineers* (2018), 70-74; Isuf Deliu, Carl Leichter, and Katrin Franke, "Extracting Cyber Threat Intelligence from Hacker Forums: Support Vector Machines Versus Convolutional Neural Networks," *IEEE International Conference on Big Data* (2017), 3648; Andrew J. Park, Brian Beck, Darrick Fletche, Patrick Lam, and Herbert H. Tsang, "Temporal Analysis of Radical Dark Web Forum Users," *2016 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining* (2016), 880-883; Hsinchun Chen, Wingyan Chung, Jialun Qin, Edna Reid, Mark Sageman, and Gabriel Weimann, "Uncovering the Dark Web: A Case Study of Jihad on the Web," *Journal of the American Society for Information Science and Technology* 59, no. 8 (2008): 1347-1350; Zoe Davey, Fabrizio Schifano, Ornella Corazza, and Paolo Deluca, "E-Psychonauts: Conducting Research in Online Drug Forum Communities," *Journal of Mental Health* 21 no. 4 (2012), 386-388; This article is a solid starting point if one wishes to go down the ethical rabbit hole of online research.

effective cybersecurity decisions" in the discussion of effective cryptomarket data collection.[65] Traditional CTI has focused on using internal network device databases, workstations, and other similar sources for data collection. Throughout this research, countermeasures that hackers use to protect against data scraping on these various platforms have posed roadblocks to the scholarship. These blocks cover cryptomarkets in a blanketed manner, preventing both ethical 'white hat' hacking as well as nefarious 'black hat' hacking. These countermeasures prevent traditional data crawling, forcing researchers to collect data manually or to utilize bots that act like real users with varying log-on times to avoid the detection of their data-collecting activities by site administrators. These methods within CTI are used to collect millions of posts, lines of conversations, and product listings in the case of cryptomarkets, with the ability to do so all in different languages.[66] Scholars have examined the feasibility of using machine learning to gather CTI to save person-hours, reduce human error, and compare performance with other learning machines.[67]

Scholars have also emphasized the success of using an Open Natural Language Processes (ONLP) program to translate the posts in question so the researchers could use a Parts of Speech (POS) tagger to filter their data further. Using a POS tagger, scholars assign values to specific words and phrases to conduct "sentiment analysis," also known as "opinion mining," to assign sentiment scores to forum users. It was determined that this method is not yet refined enough to

[65] Zhang Du, Ning Po-Yi, Mohammedreza Ebrahimi, Sagar Samtani, Ben Lazarine, Nolan Arnold, Rachael Dunn, Suntwal Sandeep, Guadalupe Angeles, Robert Schweitzer, and Hsinchun Chen, "Identifying, Collecting, and Presenting Hacker Community Data: Forums, IRC, Carding Shops, and DNMs," *Institute of Electrical and Electronics Engineers* (2018), 70-74.
[66] Du, Po-Yi, Mohammedreza Ebrahimi, Sagar Samtani, Ben Lazarine, Nolan Arnold, Rachael Dunn, Suntwal Sandeep, Guadalupe Angeles, Robert Schweitzer, and Hsinchun Chen, "Identifying, Collecting, and Presenting Hacker Community Data: Forums, IRC, Carding Shops, and DNMs," *Institute of Electrical and Electronics Engineers* (2018), 70-74.
[67] Isuf Deliu, Carl Leichter, and Katrin Franke, "Extracting Cyber Threat Intelligence from Hacker Forums: Support Vector Machines Versus Convolutional Neural Networks," *IEEE International Conference on Big Data* (2017), 3648.

have predictive abilities for counter-terrorism entities. However, this study is able to successfully show spikes in activity and link posts to terrorist events that have already occurred.[68] While this study is not directly related to cryptomarkets, the discussion of using Open Natural Language Processes is essential as this technology negates the impact of language barriers for cryptomarket users.

Self-regulated internet drug forums and their respective communities also serve as catalogs for new recreational drugs. As such, scholars examined interactions between forum participants. Observing the forums' interactions, 414 new drug compounds and combinations were identified. However, most of the information in this study was collected manually, showing the limitations of web scraping as humans are still necessary for specific areas of online research that require more finesse and judgment on what to include.[69]

Conclusion

In summary, there have been examinations of the online technology that enables the operation of cryptomarkets, trends in cryptomarket use, products offered, lifespans, the tactics law enforcement entities use to counter them, and the implications of online illicit drug sales on drug trafficking. However, the existing literature fails to examine a critical global logistical component enabling illicit online drug sales and postal delivery systems. Therefore, how does the strength of a country's postal service affect the illicit online sale of drugs through cryptomarkets?

---

[68] Andrew J. Park, Brian Beck, Darrick Fletche, Patrick Lam, and Herbert H. Tsang, "Temporal Analysis of Radical Dark Web Forum Users," *2016 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining* (2016), 880-883; Hsinchun Chen, Wingyan Chung, Jialun Qin, Edna Reid, Mark Sageman, and Gabriel Weimann, "Uncovering the Dark Web: A Case Study of Jihad on the Web," *Journal of the American Society for Information Science and Technology* 59, no. 8 (2008): 1347-1350.

[69] Zoe Davey, Fabrizio Schifano, Ornella Corazza, and Paolo Deluca, "E-Psychonauts: Conducting Research in Online Drug Forum Communities," *Journal of Mental Health* 21 no. 4 (2012), 386-388.

Next, this puzzle will be further discussed in the hypothesis and theory section within the context of the state capacity literature focusing on bureaucratic/administrative capacity as well as infrastructural capacity, which are the elements of state capacity most closely tied to the provision of public goods, such as the postal delivery systems being discussed.

CHAPTER IV: HYPOTHESIS AND THEORY

State Capacity

In the state capacity literature, there are competing definitions and methods of measurement. State capacity is defined as the capability of governmental institutions to achieve their own goals, raise revenue, possess a monopoly on force within state territory, provide public goods, and have the legal capacity to attain the rule of law.[70] Generally, state capacity can be divided into three key areas: military capacity, bureaucratic/administrative capacity, and the efficacy of professional political institutions.[71]

Some scholars have also elected to further divide state capacity into specific subcategories to define elements more narrowly. These subcategories include bureaucratic/administrative capacity, legal capacity, infrastructural capacity, fiscal capacity, and military capacity. The two subcategories most related to this project's scope are bureaucratic/administrative capacity and infrastructural capacity. Bureaucratic and administrative capacity are the efficient spending of tax money on public goods as a measure of the competence of the state. Infrastructural capacity is the territorial reach of the state, which refers to areas in which the state can exercise physical control and enforce policies.[72] Specifically with state infrastructural power, there are three approaches: the national capabilities approach, which takes

[70] Colin O'Reilly and Ryan H. Murphy, "An Index Measuring State Capacity, 1789-2018," *Economica* 89, no. 355 (2022): 713-718.
[71] Cullen S. Hendrix, "Measuring State Capacity: Theoretical and Empirical Implications for the Study of Civil Conflict," *Journal of Peace Research* 47, no. 3 (2010): 273; Cullen S. Hendrix and Joseph K. Young, "State Capacity and Terrorism: A Two-Dimensional Approach," *Security Studies* 23, no. 2 (2014): 329; Hillel D. Soifer and Matthias Vom Hau, "Unpacking the Strength of the State: The Utility of State Infrastructural Power," *Studies in Comparative International Development* 43 (2008): 220.
[72] Antonio Savoia and Kunal Sen, "Measurement, Evolution, Determinants, and Consequences of State Capacity: A Review of Recent Research," *Journal of Economic Surveys* 29, no. 3 (2014): 445-446; Hillel D. Soifer, "State Infrastructural Power: Approaches to Conceptualization and Measurement," *Studies in Comparative International Developmen*t 43 (2008): 231; Jonathan K. Hanson and Rachel Sigman, "Leviathan's Latent Dimensions: Measuring State Capacity for Comparative Political Research," *The Journal of Politics* 83, no. 4 (2021): 1495-1510.

state infrastructural power as indicative of the resources and institutional control of the central state; the weight of the state approach, which looks at the influence of state power on society; and the subnational variation approach which focuses on the level of state control in its territory.[73]

In terms of applicability, scholars have highlighted the importance of state capacity as an explanatory variable for how state institutions exercise control over economic growth, human development, civil conflict, international security, and the consolidation of democracy. With a focus on applicability also comes an emphasis on how state capacity should be about material resources and organizational competencies, not the political decisions to utilize said resources and competencies that could reduce efficacy.[74]

Scholars have created their own indices and combined those of others. In a recent case of combination, the *Quality of Government Index* from the University of Gothenburg, the *State Capacity Index* from a set of scholars, the *Government Effectiveness Index* from the World Bank, the *State Fragility Index* from the Center for Systemic Peace, the *Fragile States Index* from the Fund for Peace, the *Corruption Perceptions Index* from Transparency International, and the *Rigorous and Impartial Public Administration Index* from the Varieties of Democracy Institute were all combined in pursuit of a holistic measure of state capacity. Some measure state capacity directly, and others capture it indirectly.[75]

An example of an original measure of state capacity is the creation of a comprehensive index spanning from 1789 through 2018 with a focus on the factors of the rule of law, state

[73] Soifer, "State Infrastructural Power: Approaches to Conceptualization and Measurement," 235-236.
[74] Hanson, and Sigman, "Leviathan's Latent Dimensions: Measuring State Capacity for Comparative Political Research," 1495-1510.
[75] Vaccaro, Andrea. "Measures of State Capacity: So Similar, Yet So Different." *Quality & Quantity* 57 (2023): 2284-2286.

authority over territory, rigorous and impartial public administration, particularistic or public goods, state fiscal source of revenue, and educational equality.[76]

Beyond the scholarship that attempts to cover state capacity in the form of indices, there are more pinpointed studies related to state capacity. The quantity and quality of a state's knowledge about its citizen and their pursuits is crucial to an effective and centralized government in the case of minimizing free riding when it comes to tax collection for public goods.[77] State capacity has also been examined from a human development perspective, finding that higher levels of state capacity lead directly to higher levels of services and public goods that a state can provide, often taking the form of health care.[78] Scholars have conducted case studies on the cultivation of state capacity in specific countries, such as Colombian municipalities, through the provision of public goods.[79] Scholars have also examined the roots of state capacity in the past investments of a given state into legal and fiscal capacity, as well as how regime type affects economic growth and state capacity.[80] From an international security perspective, the implications of state capacity have been limited to terrorism. Such studies have consisted of analyses of how levels of state capacity and regime type both impact the susceptibility of a state to domestic terror attacks and the likelihood that a state will host a terror group.[81]

---

[76] O'Reilly and Murphy, "An Index Measuring State Capacity, 1789-2018," 713-718.
[77] Melissa M. Lee and Nan Zhang, "Legibility and the Informational Foundations of State Capacity," *The Journal of Politics* 79, no. 1 (2017): 118.
[78] Ottervik, "Conceptualizing and Measuring State Capacity: Testing the Validity of Tax Compliance as a Measure of State Capacity," 3.
[79] Daron, Acemoglu, Camilo García-Jimeno, and James A. Robinson, "State Capacity and Economic Development: A Network Approach," *American Economic Review* 105, no. 8 (2015): 2365.
[80] Timothy Besley and Torsten Persson, "The Origins of State Capacity: Property Rights, Taxation, and Politics," *American Economic Review* 99, no. 4 (2009): 1218; Carl Henrik Knutsen, "Democracy, State Capacity, and Economic Growth," *World Development* 43 (2013): 1; Hanna Back and Axel Hadenius "Democracy and State Capacity: Exploring a J-Shaped Relationship." *Governance* 21 (2008): 1.
[81] Seung Hoon Chae and Kim Wukki, "State Capacity Matters in 'the Middle:' A New Perspective on Domestic Terrorism," *Journal of Peace Research* xx, no. x (2023): 1-17; Cullen S. Hendrix and Joseph K. Young, "State Capacity and Terrorism: A Two-Dimensional Approach," *Security Studies* 23, no. 2 (2014): 329–363.

The state capacity literature is broad, with many similar but different definitions and indices; some specifically deal with infrastructure and international security, most commonly looking at comparisons between states, taxation, economic development, human security, and terrorism.[82] However, an area of the state capacity literature that is often neglected in the larger scholarship is the relationship between postal delivery system development and state capacity. Postal services are a public good that becomes more efficient and reliable as state capacity increases and have been utilized by past scholars to measure state capacity.[83] The greater the capacity of a state, particularly in the categories of bureaucratic/administrative capacity and infrastructural capacity, the more efficiently a state can provide public goods for its citizens, such as postal services. This is specifically achieved by retaining institutional knowledge, the bureaucracy's training and expertise, and the state's willingness and ability to enforce policies.[84]

Another important area of capacity in regard to the volume of cryptomarket based drug shipments is military capacity. The military capacity of a state is a state's ability to use force as a deterrent or to repel challenges to its authority. Military capacity is necessary for a government to achieve a monopoly on the use of force and meet that criterion to be a state.[85] Military capacity is often measured by the number of military personnel per capita, overall GDP, and

[82] Mattias Ottervik, "Conceptualizing and Measuring State Capacity: Testing the Validity of Tax Compliance as a Measure of State Capacity," *The Quality of Government Institute Working Paper Series* 20 (2013): 1; Soifer, "State Infrastructural Power: Approaches to Conceptualization and Measurement," 233; Andrea Vaccaro, "Measures of State Capacity: So Similar, Yet So Different," *Quality & Quantity* 57 (2023): 2281; Hanson and Sigman, "Leviathan's Latent Dimensions: Measuring State Capacity for Comparative Political Research," 1495.
[83] Vincent Geloso and Michael Makovi, "State Capacity and the Post Office: Evidence from Nineteenth Century Quebec," *Journal of Government and Economics* 5 (2022): 1-5; Daron Acemoglu, Jacob Moscona, and James A. Robinson, "State Capacity and American Technology: Evidence from the Nineteenth Century," *American Economic Review* 106, no. 5 (2016): 61-67; Jeffery L. Jensen, and Adam J. Ramey, "Going Postal: State Capacity and Violent Dispute Resolution," *SSRN* (2019): 1-3; Elissa Berwick and Fotini Christia, "State Capacity Redux: Integrating Classical and Experimental Contributions to an Enduring Debate," *Annual Review of Political Science* 21 (2018): 71-76.
[84] Soifer and Vom Hau, "Unpacking the Strength of the State: The Utility of State Infrastructural Power," 220-223.
[85] Hendrix, "Measuring State Capacity: Theoretical and Empirical Implications for the Study of Civil Conflict," 274; Hendrix and Young, "State Capacity and Terrorism: A Two-Dimensional Approach," 331.

annual military spending.[86] In this case, the focus of military capacity is the ability of the state to deter citizens from purchasing drugs online via cryptomarkets, along with the ability to detect drug shipments being mailed by the state postal service.

I argue that in countries with moderately strong postal systems, the highest proportion of drugs pass through those postal systems. The rationale is that postal systems that are well-developed but in states that do not yet have high-level security measures create a theoretical sweet spot, allowing cryptomarket vendors to thrive in these countries. This aforementioned theoretical sweet spot would entail more drug shipments originating from cryptomarket transactions than would otherwise be possible due to this lag in security. Essentially, it is a question of whether state military capacity lags behind bureaucratic/administrative and infrastructural capacity. I also argue that in countries with highly developed postal systems, only a moderate number of drugs pass through the mail as security measures kick in once a nation – and, therefore, its postal system – reaches a certain point of development. Lastly, countries with weak postal systems have the lowest number of transactions originating from within them as they cannot handle the same number of letters and packages as the postal systems in further stages of development, regardless of security measures.

This relationship can be visualized by the diagram below. The following section will outline what goes into the causal arrow that affects the different levels of drugs ordered via illicit online marketplaces passing through mail systems.

H1: Countries with moderately strong postal systems are more likely to have the highest volume of online drug sales proportionate to the population.

[86] Hendrix and Young, "State Capacity and Terrorism: A Two-Dimensional Approach," 331.

Strong Postal → System	Highest Capacity Postal → System, Strongest Security Measures	Moderate Quantity of Cryptomarket-Based Drug Shipments Proportionate to Population
Moderately Strong → Postal System	Moderate Capacity Postal → System, Moderate to Low Strength Security Measures	Highest Quantity of Cryptomarket-Based Drug Shipments Proportionate to Population
Weak Postal → System	Lowest Capacity Postal → System, Low-Strength Security Measures	Lowest Quantity of Cryptomarket-Based Drug Shipments Proportionate to Population

Strong Postal Systems

Countries with high levels of state capacity and strong postal delivery systems can handle the highest number of letters and parcels. These countries have postal systems with high budgets, large numbers of full-time and part-time employees, and well-established standard operating procedures. All of these facilitate the successful shipment of letters and parcels in the highest quantity compared to postal systems at different stages of development. However, in these highly developed states, security measures have likely developed within the postal system over the years, limiting the number of drugs that can be successfully shipped. Therefore, while first-class priority shipping via the United States Postal Service that can get a package from the East Coast to the West Coast in the US in 2-days is impressive, drugs in the mail are more likely to be detected in developed countries, like the United States, due to the well-established domestic security apparatuses in place. As such, the fear of being caught by law enforcement may deter dark web patrons from utilizing the postal delivery systems in the most developed countries.

Moderately Strong Postal Systems

The sale of illicit online drugs falls clearly into the category of a premeditated criminal act. Vendors must possess high technical proficiency and be methodical in conducting their

operations. This premeditated, technically skillful, and intentionally concealed act involves conscious planning, making it hypothetically easier to deter than the action of a person buying for their use, which may be influenced by addiction, emotion, or peer pressure. Selling illicit drugs online potentially carries lengthy prison sentences depending on what is being sold and where it is being shipped to/from. However, increasing already hefty punishments does little for those involved. Instead, pursuing policies that increase the likelihood of apprehending vendors may have the most impact.[87] Yet, all these steps and potential deterrents are challenging to implement given the anonymous dark web design and all associated technology. This is compounded by serious vendors' efforts, such as packing in clean rooms to avoid apprehension. Deterring premeditated acts by analytical individuals may be effective for traditional drug trafficking, but the high level of anonymity people enjoy on the dark web is an enabler.

Examples from other illicit trades, such as tobacco, can provide further explanation. The tobacco industry is primarily regulated by tax policy, prompting the illegal trade to evade and avoid such taxes. This can take the form of counterfeit cigarettes, legally exporting cigarettes in excess quantities with the knowledge they will trickle into neighboring areas, and smuggling cigarettes from low-tax to high-tax areas for resale. Attempts to deter these activities through fines and imprisonment are overcome mainly by local tolerance of illicit sales, corruption, organized crime, and individual tolerance of risk versus reward for those directly involved.[88] Another factor contributing to the difficulty in addressing both tobacco sales and the illicit online sale of drugs is that transnational crime is global and merits a global response, which often

[87] Ben Johnson, "Do Criminal Laws Deter Crime? Deterrence Theory in Criminal Justice Policy: A Primer," *Minnesota House Research Department* (2019): 1.
[88] Luk Joosens and Martin Raw, "From Cigarette Smuggling to Illicit Tobacco Trade," *Strategic Directions and Emerging Issues in Tobacco Control* 21 (2012): 230-234.

falters, allowing actors in certain areas more leeway to operate. Leeway, combined with anonymizing technology, makes for a profitable business model.

As such, deterrence may have little impact in countries with moderate-strength postal systems. Logically, there would likely be a lag in implementing security measures compared to developing a postal system more closely tied to the development of state capacity. This lag potentially allows a more significant quantity of cryptomarket-based drug shipments to pass undetected through a country's postal system. There may also be less fear of discovery and apprehension by law enforcement in countries with moderate-strength postal systems still developing security measures. Additionally, countries' geographic location and political system may result in the inherent weakening of their postal system security measures, such as in the case of the European Union member states, which have reduced barriers to trade and relative freedom of movement in comparison to other countries.

Weak Postal Systems

In countries with weak postal delivery systems, there is a lesser likelihood of sustaining cryptomarket activity, even if internet access is abundant. The primary reasons for this are that the regions with weak postal delivery systems are primarily in developing countries that do not have the demand for drugs. Still, there is a decreased likelihood in developing countries with weak postal systems that buyers have an address or secure location to deliver drugs. For example, a person living in an urban area and/or developed country will likely not have this issue. But suppose someone lives in a remote location in a developing country with a lesser developed postal system. In that case, they will likely find it problematic to have drugs delivered to them regardless of whether they have internet access and the know-how to purchase drugs on the dark web.

On the same note, but from the vendor side, vendors of illegal drugs on the dark web require access to postal delivery systems that can ship items cheaply, promptly, and reliably and handle a high volume of packages to remain profitable and undetected. The rationale for the lesser likelihood of illicit market activity in countries or regions with weak postal delivery systems includes the general limitations to participating in the online sale of drugs. For example, in addition to internet access and robust postal delivery systems, a person must acquire cryptocurrency and accept the risk of selling/purchasing drugs through a cryptomarket on the dark web. Therefore, countries with weak postal delivery systems can be largely excluded from this study as they cannot move the volume of drugs that would otherwise make them competitors with highly developed and moderately developed postal delivery systems; they simply cannot do so.

Conclusion

In this chapter, postal delivery system development, an indicator of state capacity, is hypothesized to be related to the level of illicit online drug shipments originating via cryptomarkets. Specifically, states with moderate levels of capacity are hypothesized to experience the greatest volume of cryptomarket-based drug shipments proportionate to their population due to a lag in the development of military capacity in relation to postal capacity. States with the highest levels of capacity are hypothesized to experience a moderate volume of cryptomarket-based drug shipments proportionate to their population due to the greater development of military capacity in relation to postal capacity. States with the lowest levels of capacity are expected to experience the lowest amount of cryptomarket-based drug shipments due to their lack of overall postal capacity. The following chapter will go into the specifics of the variables, research design, and methods used to conduct this analysis on the relationship between

the level of postal system development and the volume of illicit drug shipments ordered via cryptomarkets.

CHAPTER V: RESEARCH DESIGN, METHODS, AND LIMITATIONS

Introduction

No studies have measured the volume of illicit drug sales originating from cryptomarket transactions from the perspective of postal delivery system development utilizing country of origin information on cryptomarket listings. However, shipment origin data is available for the selected cryptomarket dataset, Agora. Therefore, the dependent variable will be the *Number of Illicit Drug Shipments by Country/Region of Origin,* hypothesized to depend on the level of postal delivery system development.

Norms in cryptomarket interactions, especially those of buyers, dictate how vendors operate. For example, on cryptomarkets, vendors list the country from which they are shipping. Providing this information allows vendors to accurately charge buyers for shipping and give a realistic period for processing and delivery. These accurate shipping and delivery estimates are of the utmost importance to vendors as they rely heavily on positive reviews from buyers for legitimacy on cryptomarkets. However, cryptomarket vendors rightfully have concerns about being identified by law enforcement and facing legal action. Therefore, vendors also have an incentive not to list what country they ship from or not to list any country of origin on their listings. These rational concerns about law enforcement are often overcome by the norm of leaving poor reviews for vendors perceived to misrepresent their country of origin. For example, suppose a buyer in the United States orders MDMA from a vendor that lists that they ship from the United States, but the package takes four weeks to arrive because it came from Poland. In that case, the consumer will likely leave a negative review, which could impact that vendor's future sales. An additional possibility is that vendors may list their shipments as coming from a neighboring country to decrease their security risks without too great of a shipping delay. For

example, the delay would be negligible if a vendor lives in Portugal but lists that they ship from Spain. Whether a vendor lists their country or a neighboring one, buyer demands shape vendor actions in this aspect of cryptomarket interactions.

Dependent Variable

The ideal, holistic dataset for my dependent variable belongs to the United Nations Office on Drugs and Crime (UNODC), which publishes annual World Drug Reports. For example, in Booklet 2 of the UNODC's 2021 World Drug Report, the volume of illicit drug shipments from cryptomarket transactions is sorted by country of origin noted in the listing and compared by region.[89] The dataset used by the UNODC contains 294,000 drug transactions from the 38 cryptomarkets operating from 2011-2021, 95 percent of which lists a declared country of origin in the drug shipment.[90]

Hikari Labs, a subsection of the CyLab Security & Privacy Institute at Carnegie Mellon University, created and maintains the UNODC datasets used for the annual World Drug Reports.[91] Unfortunately, CyLab and the associated Carnegie Mellon faculty have not responded to my repeated inquiries about accessing their dataset created for the UNODC. Professor-level faculty at Carnegie Mellon have been receptive to my inquiries. Still, as soon as I reach out to the managerial-level faculty that professors refer me to, I do not receive any responses. However, the conclusions that the scholars with access to this dataset have come to are still relevant for background information.

[89] United Nations Office on Drugs and Crime, *World Drug Report 2021: Booklet 2: Global Overview: Drug Demand and Drug Supply* (2021), 75-89.
[90] UNODC, *World Drug Report 2021: Booklet 2*, 79-81; see image three in Appendix for a bar graph showing the general distribution of the origins of drug shipments.
[91] United Nations Office on Drugs and Crime, "World Drug Report 2022 Methodological Annex," *Research and Trend Analysis Branch, UNODC, Vienna* (2022): 87-89.

Given that the UNODC data is inaccessible, the next best possibility is a separate dataset from Agora, which stands out amongst other available datasets on singular cryptomarkets. A dataset for Agora covering transactions from 2014-2015 is available. This period is representative of the cryptomarket, as Agora was only operational from October 2013 through August 2015.[92] Agora was in the top three operational cryptomarkets for the entirety of its lifespan, reaching the status of being the largest in February and March of 2015.[93] The available Agora dataset contains 107,603 listings by 3,192 vendors. However, the number of vendors is not important to this project. Of the 107,603 listings, 96,286 listings are usable for my purposes and span 49 states. The non-usable listings are either regions of the world instead of specific names of states (e.g., Europe, the Middle East, Oceania, South America), are jokes or vendor's usernames, or have no response. The variables included in this dataset are drug category, item description, price, shipping country of origin, acceptable destination, ratings, and other remarks. Country of origin is the focus. This ongoing documented trend in scholarly attention makes Agora a well-suited dataset. However, while this dataset is publicly available, it was not made so in a scholarly manner, presenting potential ethical concerns that come with the territory of working with cryptomarket data. This dataset became available through a collection of leaked dark web data made public when U.S. federal law enforcement shut down the site a few months after a blackmail attempt.[94] It is also essential to note that the Agora dataset covers two years of transactions, 2014-2015, but the transactions are not categorized by year. While all transactions

[92] "Dark Net Marketplace Data (Agora 2014-2015)," Last modified 2017, https://www.kaggle.com/datasets/philipjames11/dark-net-marketplace-drug-data-agora-20142015?resource=download.
[93] Joe Van Buskirk, Sundresan Naicker, Amanda Roxburgh, Raimondo Bruno, and Lucinda Burns, "Who Sells What? Country Specific Differences in Substance Availability on the Agora Cryptomarket," 16-17.
[94] "Dark Net Marketplace Data (Agora 2014-2015)," Last modified 2017, https://www.kaggle.com/datasets/philipjames11/dark-net-marketplace-drug-data-agora-20142015?resource=download.

included are known to be in one of those two years, the transactions cannot be distinguished between 2014 and 2015. This is a common theme amongst available datasets.

There are other datasets that I could potentially use for this study, but they have two significant limitations that make the Agora dataset more valid for my research. First, researchers collected data on Silk Road operations by analyzing over 24,000 transactions. This dataset provides item IDs/descriptions, sellers' usernames, shipping country of origin, acceptable shipping destinations, feedback ratings, and prices.[95] However, this publication from 2013, using data from 2011-2012, has more relevant options, such as Agora.

Dream Market stands out amongst other available data on singular cryptomarkets. Dream Market has data from 2013-2017, containing 91,463 product listings and 2,092 vendors from 120 countries.[96] It is the all-time highest-grossing cryptomarket with 448.1 million dollars in total sales.[97] This data was collected by the University of Arizona artificial intelligence lab using a special-purpose web crawler developed in Python. It includes product names, categories, descriptions, shipping options, shipping country of origin, shipping destinations, vendor usernames and years active, PGP key, seller description, and feedback ratings.[98] This is the most recent cryptomarket data created in a scholarly manner. However, it has not been filtered into a usable format and exists as a difficult-to-use SQL file that can only be converted to a CSV file in partial.

[95] Nicolas Christin, "Traveling the Silk Road: A Measurement Analysis of a Large Anonymous Online Marketplace," Carnegie Melon University (2013), 1-26. https://arima.cylab.cmu.edu/sr/.
[96] *Dream Market*, December 4, 2013 – October 4, 2017, AZSecure.org version, Accessed December 6, 2022. https://www.azsecure-data.org/dark-net-markets.html.
[97] UNODC, *World Drug Report 2021: Booklet 2*, 79.
[98] *Dream Market*, December 4, 2013 – October 4, 2017, AZSecure.org version, Accessed December 6, 2022. https://www.azsecure-data.org/dark-net-markets.html.

Independent Variable

The primary independent variable for this paper is the strength of a country's postal delivery system measured by a *State's Postal Service Operating Expenditure*, as operating expenditure is representative of workforce, resources, and capacity. I gathered this data from the United Nations' Universal Postal Union (UPU) statistical database that evaluates over 200 countries and territories by approximately 100 indicators. The Universal Postal Union (UPU) is a specialized agency of the United Nations that focuses on the international cooperation of postal systems that allows researchers to filter by country, economic development class, income groupings, states that are members of the European Union, and individual states.[99] Specifically, the data used comes from heading 5.2 in the database, which covers all operating expenditures, including the purchase of all tangible and intangible assets, staff costs and wages, depreciation of assets, third-party domestic and international mail transport charges (road, rail, sea, and air carriers), and various subsidies paid to state, public, and private institutions.[100]

State Postal Operating Expenditure is split into three even categories of low, moderate, and high across the 120 states in question that had UPU data to examine if *State Postal Operating Expenditure* has varied relationships with the number of shipments by the amount of spending. The low category has a minimum of 16,400,000, a maximum of 9,190,000,000, and a mean of 3,499,700,000, with a range of 902,600,000. The moderate category has a minimum of 9,220,000,000, a maximum of 116,000,000,000, and a mean of 35,182,250,000, with a range of 106,780,000,000. The high category has a minimum of 160,000,000,000, a maximum of 51,800,000,000,000, and a mean of 3,387,175,000,000, with a range of 51,640,000,000,000. I

[99] Universal Postal Union, "Postal Statistics," Last Modified 2021. https://www.upu.int/en/Universal-Postal-Union/Activities/Research-Publications/Postal-Statistics.
[100] Universal Postal Union, "Postal Statistics 2022: Technical Notes," Last Modified 2020, VII. https://www.upu.int/en/Universal-Postal-Union/Activities/Research-Publications/Postal-Statistics.

did this to allow for comparison between the states in distinct categories of postal development to better understand variation in the origins of cryptomarket-based drug shipments.

Additionally, it is important to follow up on the fact that with the Agora data, while all transactions occurred in 2014 or 2015, the transactions cannot be linked with certainty to one year or the other. Therefore, the independent variable of *State Postal Operating Expenditure,* as well as the various control variables to follow, have all been averaged out to give one value per variable to cover both 2014 and 2015.

Control Variables

Control variables for this study are *Annual Military Spending*, *Annual Gross Domestic Product Per Capita*, *Annual Total Number of Letters and Parcels*, *Annual Population*, *Drug Demand Country*, *Drug Source Country*, *Drug Transshipment Country*, *State Capacity,* and *Outliers*.

Annual Military Spending represents internal security measures impacting each state's postal drug interdiction operations. However, statistics on *Annual Military Spending* may be inflated as this number includes other aspects of national security not related to internal security. For example, any offensive military operations a state may conduct would increase spending. Ultimately, there is no standardized international reporting for internal customs and postal inspection budgets or spending to combat drug trafficking, making *Annual Military Spending* the best available option. The data gathered on *Annual Military Spending* is from the Correlates of War Project's dataset on national material capabilities, specifically looking at the variable in the dataset called "military expenditure."[101]

[101] Correlates of War Project, "National Material Capabilities, v6.0," *Online,* http://correlatesofwar.org; J. David Singer, "Reconstructing the Correlates of War Dataset on Material Capabilities of States, 1816-1985," *International Interactions,* 14 (1987): 115-132.

Annual Population is also included as a control because more populous states should be expected to receive a larger quantity of shipments, so that must be mitigated. Population data also comes from the Correlates of War Project's dataset on national material capabilities. It should also be noted that all variables have been framed using the country codes from the Correlates of War Project for ease of use.[102]

Annual Gross Domestic Product Per Capita will be included to demonstrate the level of economic development per state. This data is collected from the World Bank and is measured in current U.S. dollars as of 2022.[103]

The *Annual Total Number of Letters and Parcels* is included to consider the overall mail flow. I collected this data from the UPU's postal statistic database. There is no total dispatch count by country that includes domestic and international. Therefore, I added both domestic and international service dispatch, under the headings of 10.4 and 10.5, respectively, together to create this variable.[104]

Another set of variables to introduce is if the country of origin noted in a cryptomarket listing is a drug source, transshipment, or demand country. These variables are called *Drug Source Country*, *Drug Transshipment Country*, and *Drug Demand Country*.

Source countries are those in which major illicit drug production occurs. This is monitored through state self-reporting and satellite imaging conducted through the United Nation's Illicit Crop Monitoring Program (ICMP).[105] The source countries for this project are

---

[102] Correlates of War Project, "COW Country Code List, v2016," *Online,* http://correlatesofwar.org.
[103] The World Bank, "GDP Per Capita Current US$," Accessed March 27, 2023. https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?end=2021&name_desc=true&start=2005.
[104] Universal Postal Union, "Postal Statistics 2022: Technical Notes," Last Modified 2020, IX. https://www.upu.int/en/Universal-Postal-Union/Activities/Research-Publications/Postal-Statistics; Universal Postal Union, "Postal Statistics," Last Modified 2021. https://www.upu.int/en/Universal-Postal-Union/Activities/Research-Publications/Postal-Statistics.
[105] Kan, *Drug Trafficking and International Security*, 39; United Nations Office on Drugs and Crime, "UNODC and Illicit Crop Monitoring, Accessed September 4, 2023. https://www.unodc.org/unodc/en/crop-monitoring/.

Afghanistan, Bolivia, Burma, Cambodia, Colombia, Jamacia, Laos, Lebanon, Mali, Mexico, North Korea, Papua New Guinea, and Peru.[106]

Transshipment countries are locations where drugs are shipped from source countries before being sent to demand countries to evade detection by law enforcement. Traffickers select transshipment countries based on where there is a lack of security measures to detect shipments or an abundance of those willing to look the other way. The list of transshipment countries for this project are Bahamas, Belize, Cambodia, Ecuador, El Salvador, Guatemala, Guinea, Guinea-Bissau, Haiti, Honduras, Iran, Jamacia, Laos, Lebanon, Mali, Mexico, Nigeria, Pakistan, Panama, Senegal, Thailand, Tajikistan, Uzbekistan, and Vietnam.[107]

Demand countries are locations where drugs are destined to be shipped and consumed. Demand countries are the more developed countries where people have the income to spend on drugs. The list of demand countries for this project are Australia, Austria, Belgium, Brazil, Canada, China, Denmark, Finland, France, Germany, Iceland, India, Iran, Ireland, Italy, Luxembourg, Mexico, Monaco, Netherlands, New Zealand, Norway, Pakistan, Portugal, Russia, South Africa, South Korea, Spain, Sweden, Switzerland, Thailand, the United Kingdom, and the United States.[108] These three different categories of countries involved in the large-scale shipment of drugs meant for traditional sale could increase the likelihood that cryptomarket vendors have set up shop in the area.

To simplify how this control variable was put into operation, I created three dummy variables for each type of country as it relates to drug trafficking (demand, source, and

[106] Kan, *Drug Trafficking and International Security*, 40; Executive Office of the President, "Presidential Determination on Major Drug Transit or Major Illicit Drug Producing Countries for Fiscal Year 2021," September 25, 2020.
[107] Kan, *Drug Trafficking and International Security*, 40; Executive Office of the President, "Presidential Determination on Major Drug Transit or Major Illicit Drug Producing Countries for Fiscal Year 2021," September 25, 2020.
[108] Kan, *Drug Trafficking and International Security*, 42.

transshipment). If a country falls into one of these categories, it receives a score of 1; otherwise, a 0. Countries listed in these categories likely already have a steady supply of drugs within their borders, increasing the ease of sale for these drugs on cryptomarkets.

The variable of S*tate Capacity* is also used as a control. State capacity is an alternative measure for state postal system development to predict the number of illicit drug shipments ordered via cryptomarkets. Should a correlation be identified between the number of illicit drug shipments ordered via cryptomarkets and postal operating expenditure, this would broaden the applicability to state capacity. This measure is taken from a comprehensive index that tracks state capacity from 1789 through 2018 across 174 countries utilizing six variables from the Varieties of Democracy (V-Dem) dataset: the rule of law, the authority of a state over its territory, the rigorousness and impartiality of public administration, whether public expenditures are on particularistic or public goods, the modernity of the state's source of its revenue, and the universality of the provision of education.[109] I first ran Model 1 without the inclusion of state capacity, as state postal expenditure is already inferential to state capacity. I then ran Model 2 with the inclusion of state capacity as a formal variable.

Lastly, outliers were controlled for as three states accounted for 61.84 percent of the total number of observed transactions. The United States had 35,252 transactions at 36.61 percent of the overall data, the United Kingdom had 13,634 transactions at 14.16 percent of the overall data, and Australia had 10,656 transactions at 11.01 percent of the overall data.

[109] O'Reilly and Murphy, "An Index Measuring State Capacity, 1789-2018," 713. An updated dataset through 2022 is available as well: Colin W. O'Reilly, "State Capacity Index," Accessed October 3, 2023. http://www.colinworeilly.com/state-capacity-index.html.

Methods

This study approximates a negative binomial event-count model because event-count models utilize maximum likelihood estimation to measure the likelihood of an event occurring. The distribution of events here is skewed and discrete, given that event counts take on nonnegative integer values. Errors produced are not normally distributed or homoscedastic.[110] Count fit is used to select the negative binomial regression model over other models as the test of best fit.[111] Models of the relationship are contained in the next section.

Empirical Results

To review, my hypothesized relationship is that the highest proportion of drugs purchased via cryptomarkets would pass through the postal systems of states with moderately strong postal systems. Moderately strong postal systems, in this case, are categorized as the middle 40 states in terms of postal operating expenditure. The rationale is that postal systems that are well-developed but in states that do not yet have high-level security measures create a theoretical sweet spot, allowing cryptomarket vendors to thrive in these countries. This aforementioned theoretical sweet spot would entail more drug shipments originating from cryptomarket transactions than would otherwise be possible due to this lag in security. It is essentially a question of whether state military capacity lags behind bureaucratic/administrative and infrastructural capacity, of which postal capacity is indicative.

I also hypothesize that in states with highly developed postal systems, only a moderate number of drugs pass through the mail as security measures kick in once a nation – and,

---

[110] John Scott Long, *Regression Models for Categorical and Limited Dependent Variables,* Thousand Oaks, California: Sage Publications, 1997; Moises Arce and Michael Hendricks, "Resource Wealth and Political Decentralization in Latin America," *Oxford University Press* (2019): 13.
[111] J. Scott Long and Jeremy Freese, *Regression Models for Categorical Dependent Variables Using Stata*. 3rd ed. (College Station: Stata Press, 2014): 507, 551-553.

therefore, its postal system – reaches a certain point of development. Lastly, countries with weak postal systems have the lowest number of transactions originating from within them as they cannot handle the same number of letters and packages as the postal systems in further stages of development, regardless of security measures.

Table 5.1: Empirical Results

	Model 1	Model 2
VARIABLES	Agora	Agora
Low State Postal Operating Expenditure	5.6181 (4.745)	4.6043 (2.997)
Moderate State Postal Operating Expenditure	8.5301* (4.870)	7.6994** (3.031)
High State Postal Operating Expenditure	11.1472** (4.664)	10.9178*** (2.989)
Total Number of Letters and Parcels	-0.0000** (0.000)	-0.0000** (0.000)
State Capacity	- -	-0.2411 (0.337)
Population	-0.0000 (0.000)	-0.0000 (0.000)
Annual Military Spending	0.0000*** (0.000)	0.0000*** (0.000)
Gross Domestic Product Per Capita	0.0133*** (0.005)	0.0166*** (0.006)
Demand Country	2.6175*** (0.801)	2.7269*** (0.804)
Source Country	-0.4978 (0.852)	-0.5622 (0.861)
Transshipment Country	0.8498 (1.098)	0.9753 (1.116)
Outliers (Australia, United Kingdom, United States)	2.3835*** (0.739)	2.3888*** (0.732)
Constant	-7.0800 (4.726)	-6.1363** (2.980)
Observations	218	218

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5.1 summarizes my findings. I find statistically significant relationships; however, it does not entirely support my initial hypothesis that states with a moderate amount of state postal operating expenditure have the highest proportion of shipments. Model 1 contains the outcomes for Agora without the inclusion of state capacity, as state postal expenditure is already

inferential to state capacity, as previously stated. Model 2 was run with the inclusion of state capacity as its own variable.

In order of the table, low state postal operating expenditure was found not to have significance for either model. This was no surprise and not contested by my hypothesis as these states do not have the postal capacity to challenge states with moderate or high state postal operating expenditures, amongst other limitations. I found moderate state postal operating expenditure to be statistically significant with a p-value<0.1 in Model 1 when state capacity was not controlled for and to be statistically significant with a p-value<0.05 when state capacity was controlled for. This would support my hypothesis if it were the only category of state postal operating expenditure that had significance. However, this is not the case. I found that high state postal operating expenditure to be statistically significant with a p-value<0.05 in Model 1 when state capacity was not controlled for and to be statistically significant with a p-value<0.01 when state capacity was controlled for, surpassing the significance of moderate state postal operating expenditure. This shows that even with all controls in place, states with a high level of postal operating expenditure were found to experience the highest proportion of cryptomarket-based drug transactions. This aligns with the trend of more developed states that, in turn, have the highest levels of postal operating expenditure, having the largest consumer bases with disposable income to spend on drugs.

Amongst the nine control variables, I found five to be statistically significant, both with and without the inclusion of state capacity as its own variable. Those five were the *Total Number of Letters and Parcels*, *Annual Military Spending*, *GDP Per Capita*, *Demand Country*, and the *Outliers*. All of these controls were oriented towards more developed states with a greater demand amongst consumers for drugs and higher postal operating expenditures.

Some control variables were also found to have no significance in either model. These are *State Capacity*, *Population*, *Source Country*, and *Transshipment Country*. As already discussed, state capacity is linked to postal operating expenditure, so it proved to be redundant in the control. Along similar lines, the population was already controlled for in part by GDP per capita. Lastly, source and transshipment countries are generally less developed countries with a lesser demand for drugs amongst consumers and with low state postal operations, as listed above.

Marginal Effects

With the use of negative binomial regression, the inclusion of marginal effects adds to the interpretability and weight of my findings. While negative binomial regression models are often utilized to analyze count data, as I did here, the coefficients produced through the resultant models are not easily interpreted. Calculating marginal effects leads to a greater understanding of how changes in independent variables impact the expected count, or rate, of the dependent variable, allowing for gathering practical implications. The inclusion of marginal effects also allows for the interpretation of incidence rate ratios (IRRs), particularly for dummy variables and interaction terms. As my research analyzes delicate relationships with potential policy implications, the use of marginal effects leads to a more comprehensive interpretation of findings, bolstering robustness and applicability.[112]

Earlier in this chapter, I introduced two negative binomial regression models. The two marginal effects models I present here coincide with those models. The first model does not include state capacity as its own variable, instead inferring it through the level of postal development, while the second model explicitly includes state capacity as its own variable.

[112] Long and Freese, *Regression Models for Categorical Dependent Variables Using Stata*, 516-517.

Model 1 of the marginal effects found if the marginal effect at 'postal expenditure=1 for mid states' is 3,330,101, it suggests that, compared to the reference level (dummy_variable=0), for low or high states, having 'dummy_variable=1' is associated with a 3,330,101-unit increase in the incidence rate. This means that states with a moderate level of postal expenditure are projected to see a 3,330,101-unit increase in cryptomarket-based drug shipments in comparison to states with low or moderate state postal expenditure. Model 1 also found if the marginal effect at 'postal expenditure=1 for high states' is 22,300,000, it suggests that, compared to the reference level (dummy_variable=0), for low or mid states, having 'dummy_variable=1' is associated with a 22,300,000-unit increase in the incidence rate. This means that states with a high level of postal expenditure are projected to see a 22,300,000-unit increase in cryptomarket-based drug shipments in comparison to states with low or moderate state postal expenditure.

Model 2 of the marginal effects, in which state capacity was explicitly controlled, found if the marginal effect at 'postal expenditure=1 for mid states' is 1,511,707, it suggests that, compared to the reference level (dummy_variable=0), for low or high states, having 'dummy_variable=1' is associated with a 1,511,707-unit increase in the incidence rate. This means that states with a moderate level of postal expenditure are projected to see a 3,330,101-unit increase in cryptomarket-based drug shipments in comparison to states with low or moderate state postal expenditure. Model 2 also found if the marginal effect at 'postal expenditure=1 for high states' is 17,500,000, it suggests that, compared to the reference level (dummy_variable=0), for low or mid states, having 'dummy_variable=1' is associated with a 17,500,000-unit increase in the incidence rate. This means that states with a high level of postal expenditure are projected to see a 17,500,000-unit increase in cryptomarket based drug shipments in comparison to states with low or moderate state postal-expenditure.

Both of these models generalize the conclusions drawn from the Agora dataset to put the number of transactions into real numbers to determine how significant the difference in the number of cryptomarket-based drug transactions is between states in the different categories of state postal expenditure.

Limitations

While I have made some comments throughout this paper about the limitations of different areas of this project, there are some general limitations to cryptomarket data collection that apply to all past and present datasets, Agora included. Vendors on any cryptomarket offer information on the quantities of items offered and the asking prices. After a transaction has taken place, the buyer usually leaves feedback about the vendor and item under the item listed. Therefore, while the actual flows of money and goods/services cannot be tracked, the feedback left by buyers can be seen as a proxy for a transaction. This, however, leads to a conservative count of transactions. While all buyers do not leave feedback, it is mandatory to do so on a vast majority of cryptomarkets due to the importance of feedback as a security and marketing tool on the dark web. Buyers could also potentially purchase more than the minimum quantity without their larger purchase being reflected in the review. This contributes to the conservative nature of cryptomarket transaction estimates, even though most buyers stick to standard purchase quantities or purchase quantities only slightly over the standard.[113]

There were also limitations with the use of the country codes from the Correlates of War Project due to the lack of country codes for Greenland, Serbia, Bermuda, and various small

[113] Kyle Soska and Nicolas Christin, "Measuring the Longitudinal Evolution of the Online Anonymous Marketplace Ecosystem," *24th USENIX Association Security Symposium* (2015): 33-48.

island states.[114] Island states are prime locations for the transshipment of drugs, and it would have been beneficial to include this data.[115]

The focus on state postal services poses another limitation to the project as the United Nations Universal Postal Union tracks state postal service data only. The United States Postal Service (USPS) and comparable states' postal services are the foremost shippers of drugs purchased online; hence, they were the focus of this project.[116] However, the United Parcel Service (UPS); FedEx; Dalsey, Hillblom, and Lynn (DHL); and other major private sector shipping services undoubtedly ship drugs too, but at least in the U.S., cannot compete with the USPS pricing for first class mail weighing less than a pound. With the plethora of regional and state-specific private-sector shipping services, standardization would be another issue for covering all shipping services.

Furthermore, there are inherent difficulties in studying any criminal activity, especially dark web cybercrime. In general, those participating in any illegal activity wish to keep that activity a secret. This desire for anonymity is primarily directed at law enforcement but extends to the public and researchers. This blanket barrier to studying criminal activity is compounded by the dark web, where interactions are inherently anonymous, with anonymity further manufactured by certain cryptocurrencies, proper individual encryption use, and other methods.

---

[114] Correlates of War Project, "COW Country Code List, v2016," *Online,* http://correlatesofwar.org.
[115] Jose Sousa-Santos, "Drug Trafficking in the Pacific Islands: The Impact of Transnational Crime," *Lowy Institute* (2022): 1-36. https://www.lowyinstitute.org/publications/drug-trafficking-pacific-islands-impact-transnational-crime.
[116] Judith Aldridge and Rebecca Askew, "Delivery Dilemmas: How Drug Cryptomarket Users Identify and Seek to Reduce Their Risk of Detection by Law Enforcement," *International Journal of Drug Policy* 41 (2017): 101-109; Joe Davidson, "Postal Service – The Preferred Shipper for Drug Dealers," *The Washington Post*, October 16, 2018. https://www.washingtonpost.com/politics/2018/10/16/postal-service-preferred-shipper-drug-dealers/.

Consequently, certain variables may be difficult or impossible to ascertain depending on the facet of dark web interactions examined.[117]

With that being said, this thesis is one of the first projects, if not the first, to look at cryptomarkets in this way, and it does confirm that countries with moderate and high postal operating expenditures have a significant number of drugs being shipped out of them originating from cryptomarket based sales. If nothing more, this shows that cryptomarket-based drug transactions generally follow the same trends of traditional drug sales, with consumers in developed countries driving the demand for drugs. The marginal effects further showed the large scale of cryptomarket-based drug shipments in states with moderate or high levels of state postal operating expenditure.

While the results found do not match my initial hypotheses for the models I ran, that does not rule out the potential for future significance on this topic due to the unreliability of the presently available data. The Agora dataset used for this project is the best open-source dataset available at this point. Still, it covers a limited timeframe, and a limited number of transactions and became public due to a data leak of the cryptomarket's history following the closure of the site due to the actions of U.S. federal law enforcement agencies. As mentioned in the previous chapter, the holy grail of cryptomarket datasets does exist and covers hundreds of thousands of cryptomarket drug transactions from 38 cryptomarkets over ten plus years, but the UNODC and Hikari Labs hold it, a subsection of the CyLab Security & Privacy Institute at Carnegie Mellon University. If I ran the same models instead with the UNODC's currently inaccessible dataset, that would provide a more complete view of the topic and could likely produce support for my hypotheses. Even if meaningful significance was not found when replicating this study with the

[117] For more on the difficulties of studying cybercrime and theorizing cybercrime see: Majid Yar and Kevin F. Steinmetz, *Cybercrime and Society*, 3rd Edition, Los Angelos: Sage, 2019.

UNODC data, that would at least provide a more definitive null result than my current lack of strong findings that can currently be attributed to data issues.

Conclusion

In this chapter, I outlined my research design, as well as the methods that produced my results. I did not find my hypothesis to be substantiated, even with extensive control measures in place. However, I did find that states with a high level of postal operating expenditure were found to experience the highest proportion of cryptomarket-based drug transactions. This aligns with the trend of more developed states, that in turn have the highest levels of postal operating expenditure, having the largest consumer bases with disposable income to spend on drugs as seen in traditional drug trafficking. Marginal effects also produced significance with projections on the volume of drug shipments originating via cryptomarkets by classification of state postal operating expenditure. In the next and final chapter, I will cover policy implications and avenues for future research.

CHAPTER VI: CONCLUSIONS AND POLICY IMPLICATIONS

Conclusions

The hypothesized lag in security, what I referred to earlier as the theoretical sweet spot, as states transition from the category of moderate state postal operating expenditure to the category of high state postal operating expenditure was not found to be substantiated at this point in time. Yet, this paper certainly provides insight into how the strength of a state's postal system, which is inferential of state capacity, affects the illicit online sale of drugs through cryptomarkets.

At this point, it would seem that the bureaucratic and administrative categories of state capacity translate the most to postal capacity, thereby facilitating cryptomarket drug trafficking. Still, with the drug trade being a demand-driven system, the countries without as significant of demand for drugs do not have the postal capacity to sustain cryptomarket operations. Postal capacity as a form of state capacity could play a role in dictating trends in cryptomarkets. In conclusion, consumer demand for drugs is what drives the drug trade, and postal capacity facilitates the success of cryptomarkets in providing drugs.

Policy Implications

While this project does not provide any explicit policy recommendations from the findings, there are significant policy implications. At a general level, this project brings awareness to the fact that cryptomarket sales seem to mirror normal drug trafficking geo-narcotics. This is important as much research has been done on the trends and implications of traditional drug trafficking, which this research can potentially expand the application of. Additionally, this research can hopefully be taken into consideration as part of the futility of the current global drug prohibition regime. If drug use remains criminalized and drug access remains

restricted, sales can increasingly take to cryptomarkets and other corners of the internet that support untraceable sales. This needs to be taken into consideration by policymakers.

This project also shows the inefficacy of state postal security measures in preventing the delivery of drugs. Federal law enforcement agencies pursuing online vendors of drugs through mistakes they make online is difficult given the inherent anonymity of cryptomarkets, but in theory the physical detection of drugs should be easier. However, despite the spending of states in the categories of moderate state postal operating expenditure and especially those in the category of high state postal operating expenditure, some of which go to postal security, massive quantities of drugs are still going undetected. The tactics, techniques, and procedures used in stealth shipping are known to scholars as I discussed earlier in this study, so they are certainly known to law enforcement as well. The factors that limit a high percentage of physical detection are likely time, personnel, and funding for detection equipment.[118]

While drugs may not be the most concerning items to ship in the mail, the case of cryptomarkets-based drug shipments going undetected and untraced to a large degree highlights weaknesses in state postal security that more nefarious actors could exploit to transport chemical, biological, or nuclear weapons and their components; large quantities of synthetic opioids such as fentanyl; small arms; and domestically controlled technologies like analog night vision components, drone circuits, and more.

Future research on this topic should focus on revisiting the research question I pursued here if the UNODC's cryptomarket dataset becomes available to the public. As I mentioned in the limitations section of the previous chapter, replicating this project with the UNODC's data

[118] Christoher J. Moloney, N. Prabha Unnithan, and Weiqi Zhang, "Assessing Law Enforcement's Cybercrime Capacity and Capability," FBI: Law Enforcement Bulletin, April 6, 2022. https://leb.fbi.gov/articles/featured-articles/assessing-law-enforcements-cybercrime-capacity-and-capability-; Coleman McKoy, "Law Enforcement Officers' Perceptions in Combating Cybercrime at the Local Level," *Walden University*. 2021.

would provide more definitive results. In addition to revisiting the same topic with better data that is not yet available, other opportunities for future research include examining trends in the sourcing, sale, and shipment of new psychoactive substances (NPS) on the clear web and dark web; exploring the relationship between state capacity and the traditional drug trade; tracking the lifecycles of cryptomarkets over time; and tracking the lifecycles of single vendor shops on the dark web in order to further the scholarship.

REFERENCES

Acemoglu, Daron, Moscona, Jacob, and Robinson, James A. "State Capacity and American Technology: Evidence from the Nineteenth Century." *American Economic Review* 106, no. 5 (2016): 61-67.

Acemoglu, Daron, García-Jimeno, Camilo and Robinson, James A. "State Capacity and Economic Development: A Network Approach." *American Economic Review* 105, no. 8 (2015): 2364-2409.

Afilipoaie, Alois and Shortis, Patrick. "From Dealership to Doorstep – How Drugs Are Sold on the Dark Net." *Global Drug Policy Observatory* (2015): 1-8.

Aldridge, Judith and Décary-Hétu, David. "Not an 'eBay for Drugs': The Cryptomarket '*Silk Road*' as a Paradigm Shifting Criminal Innovation." *SSRN* (2014): 1-25.

Aldridge, Judith and Décary-Hétu, David. "Hidden Wholesale: The Drug Diffusing Capacity of Online Drug Cryptomarkets." *International Journal of Drug Policy* 35 (2016): 7-15.

Aldridge, Judith and Askew, Rebecca. "Delivery Dilemmas: How Drug Cryptomarket Users Identify and Seek to Reduce Their Risk of Detection by Law Enforcement." *International Journal of Drug Policy* 41 (2017): 101-109.

Andrabi, Tahir, Bharat, Sheetal, and Kuehlwein, Michael. "Post Offices and British Indian Grain Price Conversion." *Economic History of Developing Regions* 35, no. 1 (2020): 23-49.

Arce, Moises and Hendricks, Michael. "Resource Wealth and Political Decentralization in Latin America." *Oxford University Press* (2019): 1-28.

Back, Hanna and Hadenius, Axel. "Democracy and State Capacity: Exploring a J-Shaped Relationship." *Governance* 21 (2008): 1-24.

Barratt, Monica J. and Aldridge, Judith. “Everything You Always Wanted to Know About Drug Cryptomarkets* (*But Were Afraid to Ask).” *International Journal of Drug Policy* 35 (2016): 1-13.

Barratt, Monica J., Lamy, Francois R., Engel, Liam, Davies, Emma, Puljevic, Cheneal, Ferris, Jason A. and Winstock, Adam R. “Exploring Televend, an Innovative Combination of Cryptomarket and Messaging App Technologies for Trading Prohibited Drugs.” *Drug and Alcohol Dependence* 231 (2022): 1-9.

Barratt, Monica J., Ferris, Jason A., Winstock, Adam R. “Safer Scoring? Cryptomarkets, Social Supply and Drug Market Violence.” *International Journal of Drug Policy* 34 (2016): 24-31.

Barratt, Monica J., Ferris, Jason A., and Winstock, Adam R. “Use of *Silk Road*, the Online Drug Marketplace, in the U.K., Australia, and the USA.” *Addiction* 109, no. 5 (2013): 774-783.

Berwick, Elissa, and Christia, Fotini. “State Capacity Redux: Integrating Classical and Experimental Contributions to an Enduring Debate.” *Annual Review of Political Science* 21 (2018): 71-91

Besley, Timothy, and Perrson, Torsten. “The Origins of State Capacity: Property Rights, Taxation, and Politics.” *American Economic Review* 99, no. 4 (2009): 1218-1244.

Bosman, Sarah. “Mythbuster: Does Crime Prevented Mean Crime Displaced?” European Crime Prevention Network (2022): 1-9.

Chae, Seung Hoon and Kim, Wukki. “State Capacity Matters in ‘the Middle:’ A New Perspective on Domestic Terrorism.” *Journal of Peace Research* xx, no. x (2023): 1-17.

Chen, Hsinchun, Chung, Wingyan, Qin, Jialun, Reid, Edna, Sageman, Mark and Weimann, Gabriel. "Uncovering the Dark Web: A Case Study of Jihad on the Web." *Journal of the American Society for Information Science and Technology* 59, no. 8 (2008): 1347-1359.

Chong, Alberto, La Porta, Rafael, Lopez-de-Silanes, Florencio, and Shfeifer, Andrei. "Letter Grading Government Efficiency." *Journal of the European Economic Association* 12, no. 2 (2014): 277-298.

Christin, Nicolas. "Traveling the Silk Road: A Measurement Analysis of a Large Anonymous Online Marketplace," Carnegie Melon University (2018), 1-26.

Correlates of War Project. "COW Country Code List, v2016." *Online,* http://correlatesofwar.org.

Correlates of War Project, "National Material Capabilities, v6.0." *Online,* http://correlatesofwar.org.

Damien, Rhumorbarbe, Ludovic, Staehli, Julian, Broséus, Quentin, Rossy, Pierre, Esseiva. "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* (2016): 1-18.

Davey, Zoe, Schifano, Fabrizio, Corazza, Ornella, Deluca, Paolo. "E-Psychonauts: Conducting Research in Online Drug Forum Communities." *Journal of Mental Health* 21 no. 4 (2012): 386-394.

Davidson, Joe. "Postal Service – The Preferred Shipper for Drug Dealers." *The Washington Post*. October 16, 2018. https://www.washingtonpost.com/politics/2018/10/16/postal-service-preferred-shipper-drug-dealers/.

Décary-Hétu, David and Giommoni, Luca. “Do Police Crackdowns Disrupt Drug Cryptomarkets? A Longitudinal Analysis of the Effect of Operation Onymous.” *Crime, Law, and Social Change* 67, no. 1 (2017): 55-75.

Deliu, Isuf, Leichter, Carl, Franke, Katrin. “Extracting Cyber Threat Intelligence from Hacker Forums: Support Vector Machines Versus Convolutional Neural Networks.” *IEEE International Conference on Big Data* (2017): 3648-3656.

Demant, Jakob, Munksgaard, Rasmus, Houborg, Esben. “Personal Use, Social Supply or Redistribution? Cryptomarket Demand on Silk Road 2 and Agora.” *Trends in Organized Crime* 21 (2018): 42-61.

Dream Market. December 4, 2013 – October 4, 2017. AZSecure.org version. Accessed December 6, 2022. https://www.azsecure-data.org/dark-net-markets.html.

Du, Po-Yi, Zhang, Ning, Ebrahimi, Mohammedreza, Samtani, Sagar, Lazarine, Ben, Arnold, Nolan, Dunn, Rachael, Suntwal Sandeep, Angeles Guadalupe, Schweitzer, Robert, and Chen, Hsinchun. “Identifying, Collecting, and Presenting Hacker Community Data: Forums, IRC, Carding Shops, and DNMs.” *Institute of Electrical and Electronics Engineers* (2018): 70-75.

Ebay. “Selling.” Accessed February 21, 2024. https://www.ebay.com/help/selling.

Encyclopedia Britanica. “Strain Theory.” Accessed September 15, 2023. https://www.britannica.com/topic/victimology.

Espinosa, Romain. “Scamming and the Reputation of Drug Dealers on Darknet Markets.” *International Journal of Industrial Organization* 67 (2019): 1-49.

Europol. “Internet Organised Crime Threat Assessment (IOCTA).” *European Union Agency for Law Enforcement Cooperation*, 2020.

Executive Office of the President, "Presidential Determination on Major Drug Transit or Major Illicit Drug Producing Countries for Fiscal Year 2021," September 25, 2020.

Feakin, Tobias. "Cryptomarkets: Illicit Goods on the Darknet." *Australian Strategic Policy Institute: The Strategist*. November 6, 2014.

Gehl, Robert W. *Weaving the Dark Web: Legitimacy on Freenet, Tor, and I2P*. Cambridge/London: The MIT Press, 2018.

Geloso, Vincent and Makovi, Michael. "State Capacity and the Post Office: Evidence from Nineteenth Century Quebec." *Journal of Government and Economics* 5 (2022): 1-18.

Guan, Xiangyang, Chen, Cynthia, and Work, Dan. "Tracking the Evolution of Infrastructure Systems and Mass Responses Using Publicly Available Data." *PLOS ONE* 11, no. 12 (2016): 1-17.

Hanson, Jonathan K. and Sigman, Rachel. "Leviathan's Latent Dimensions: Measuring State Capacity for Comparative Political Research." *The Journal of Politics* 83, no. 4 (2021): 1495-1510.

Hardle, Wolfgang Karl, Harvey, Campbell R., and Reule, Raphael C. G. "Understanding Cryptocurrencies." *Journal of Financial Econometrics* 18, no. 2 (2020): 181–208.

Heidenreich, Sarah and Westbrooks II, Dennis A. "Darknet Markets: A Modern Day Enigma for Law Enforcement and the Intelligence Community." *American Intelligence Journal* 34, no. 1 (2017): 38-44.

Hendrix, Cullen S. "Measuring State Capacity: Theoretical and Empirical Implications for the Study of Civil Conflict." *Journal of Peace Research* 47, no. 3 (2010): 273-285.

Hendrix, Cullen S. and Young, Joseph K. "State Capacity and Terrorism: A Two-Dimensional Approach." *Security Studies* 23, no. 2 (2014): 329-363.

The Hidden Wiki. “The Darknet Guide – The Hidden Wiki.” Accessed 28 February 2024. https://thehiddenwiki.org/.

Jensen, Jeffery L. and Ramey, Adam J. “Going Postal: State Capacity and Violent Dispute Resolution.” *SSRN* (2019): 1-33.

Johnson, Ben. “Do Criminal Laws Deter Crime? Deterrence Theory in Criminal Justice Policy: A Primer.” *Minnesota House Research Department* (2019): 1-24.

Joosens, Luk and Raw, Martin. “From Cigarette Smuggling to Illicit Tobacco Trade.” *Strategic Directions and Emerging Issues in Tobacco Control* 21 (2012): 230-234.

Kan, Paul Rexton. *Drug Trafficking and International Security*. Lanham: Rowman & Littlefield, 2016.

Knutsen, Carl Henrik. “Democracy, State Capacity, and Economic Growth.” *World Development* 43 (2013): 1-18.

Ladegaard, Isak. “Instantly Hooked? Freebies and Samples of Opioids, Cannabis, MDMA, and Other Drugs in an Illicit E-Commerce Market.” *Journal of Drug Issues* 48, no. 2 (2017): 226-245.

Lee, Melissa M. and Zhang, Nan. “Legibility and the Informational Foundations of State Capacity.” *The Journal of Politics* 79, no. 1 (2017): 118-132.

Leher, William, Clark, David, Bauer, Steve, Berger, Arthur and Richter, Phillip. “Wither the Public Internet?” *Journal of Information Policy* 9 (2019): 1-42.

Levy, Steven. *Crypto: How the Code Rebels Beat the Government – Saving Privacy in the Digital Age*. New York: Penguin Group, 2001.

Li, Zhengyi, Du, Xiangyu, Jiang, Xiaoqian, and Champagne-Langabeer, Tiffany. "Demystifying the Dark Web Opioid Trade: Content Analysis on Anonymous Market Listings and Forum Posts." *Journal of Medical Internet Research* 23, no. 2 (2021): 1-16.

Long, John Scott. *Regression Models for Categorical and Limited Dependent Variables.* Thousand Oaks, California: Sage Publications, 1997.

Long, J. Scott and Freese, Jeremy. *Regression Models for Categorical Dependent Variables Using Stata*. 3rd ed. College Station: Stata Press, 2014.

Martin, James, Cunliffe, Jack, Décary-Hétu, David, and Aldridge Judith. "Effect of Restricting the Legal Supply of Prescription Opioids on Buying through Online Illicit Marketplaces: Interrupted Time Series Analysis." *Research* (2018): 1-5.

Martin, James, Munksgaard, Rasmus, Coomber, Ross, Demant, Jakob, Barratt, Monica J. "Selling Drugs on Darkweb Cryptomarkets: Differentiated Pathways, Risks and Rewards." *The British Journal of Criminology* 60, no.3 (2019): 559-578.

Coleman McKoy, Coleman. "Law Enforcement Officers' Perceptions in Combating Cybercrime at the Local Level." *Walden University*. 2021.

Moloney, Christoher J., Unnithan, N. Prabha, and Zhang, Weiqi. "Assessing Law Enforcement's Cybercrime Capacity and Capability." FBI: Law Enforcement Bulletin, April 6, 2022. https://leb.fbi.gov/articles/featured-articles/assessing-law-enforcements-cybercrime-capacity-and-capability-.

Munksgaard, Rasmus, Ferris, Jason A., Winstock, Adam, Maier, Larissa J., and Barratt, Monica J. "Better Bang for the Buck? Generalizing Trust in Online Drug Markets." *The British Journal of Criminology* XX (2022): 1-23.

Narishkin, Abby and Cannon, Steve. "How JFK Customs Searches 1 Million Packages a Day for Illegal Items." *Business Insider,* March 23, 2021. https://www.businessinsider.com/jfk-customs-searches-million-mail-packages-drugs-counterfeit-2019-9.

Oksanen, Atte, Miller Bryan L., Savolainen, Iina, Sirola, Anu, Demant, Jakob, Kaakinen, Markus and Zych, Izabela. "Social Media and Access to Drugs Online: A Nationwide Study in the United States and Spain among Adolescents and Young Adults." *The European Journal of Psychology Applied to Legal Context* 13, no. 1 (2021): 29-36.

O'Reilly, Colin and Murphy, Ryan H. "An Index Measuring State Capacity, 1789-2018." *Economica* 89, no. 355 (2022): 713-745.

Ormsby, Eileen. *Silk Road.* Sydney: Pan Macmillan Australia, 2014.

Ottervik, Mattias. "Conceptualizing and Measuring State Capacity: Testing the Validity of Tax Compliance as a Measure of State Capacity." *The Quality of Government Institute Working Paper Series* 20 (2013): 1-39.

Park, Andrew J., Beck, Brian, Fletche, Darrick, Lam, Patrick, and Tsang, Herbert H. "Temporal Analysis of Radical Dark Web Forum Users." *2016 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining* (2016): 880-883.

Park, Andrew J., Quadari, Ruhi Naaz, and Tsang, Herbert H. "Phishing Website Detection Framework Through Web Scraping and Data Mining." *Information Technology, Electronics and Mobile Communication Conference* (2017): 680-684.

Phelps, Amy and Watt, Alan. "I Shop Online – Recreationally! Internet Anonymity and *Silk Road* Enabling Drug Use in Australia." *Digital Investigation* 11, no. 4 (2014): 261-272.

Richet, Jean-Loup. "Laundering Money Online: A Review of Cybercriminals' Methods." *Tools and Resources for Anti-Corruption Knowledge – United Nations Office on Drugs and Crime* (2013), 1-19.

Rogowski, Jon C., Gerring, John, Maguire, Matthew, and Cojocaru, Lee. "Public Infrastructure and Economic Development: Evidence from Postal Systems." *American Journal of Political Science* 0, no. 00 (2021): 1-17.

Rohrlich, Justin. "Drug Traffickers' Favorite Way to Move Fentanyl is FedEx and USPS." *Quartz*. May 30, 2019. https://qz.com/1627572/drug-traffickers-favorite-way-to-move-fentanyl-is-fedex-and-usps.

Savoia, Antonio and Sen, Kunal. "Measurement, Evolution, Determinants, and Consequences of State Capacity: A Review of Recent Research." *Journal of Economic Surveys* 29, no. 3 (2014): 441-458.

Singer, J. David. "Reconstructing the Correlates of War Dataset on Material Capabilities of States, 1816-1985." *International Interactions,* 14 (1987): 115-132.

Scrivens, Ryan, Davies, Garth, Frank, Richard, Mei, Joseph. "Sentiment-Based Identification of Radical Authors (SIRA)." *2015 IEEE International Conference on Data Mining Workshop (ICDMW)* (2015): 1-8.

Soifer, Hillel D. "State Infrastructural Power: Approaches to Conceptualization and Measurement." *Studies in Comparative International Developmen*t 43 (2008): 231-251.

Soifer, Hillel D. and Vom Hau, Matthias. "Unpacking the Strength of the State: The Utility of State Infrastructural Power." *Studies in Comparative International Development* 43 (2008): 219-230.

Soska, Kyle and Christin, Nicolas. Measuring the Longitudinal Evolution of the Online Anonymous Marketplace Ecosystem." *24th USENIX Association Security Symposium* (2015): 33-48.

Sousa-Santos, Jose. "Drug Trafficking in the Pacific Islands: The Impact of Transnational Crime." *Lowy Institute* (2022): 1-36. https://www.lowyinstitute.org/publications/drug-trafficking-pacific-islands-impact-transnational-crime.

Stockholm International Peace Research Institute (SIPRI). "SIPRI Military Expenditure Database." Accessed April 29, 2023. https://milex.sipri.org/sipri.

United Nations Office on Drugs and Crime. "World Drug Report 2021: Booklet 1: Executive Summary: Policy Implications." *United Nations Office on Drugs and Crime*, 2021. https://www.unodc.org/res/wdr2021/field/WDR21_Booklet_1.pdf.

United Nations Office on Drugs and Crime. "World Drug Report 2021: Booklet 2: Global Overview: Drug Demand and Drug Supply." *United Nations Office on Drugs and Crime*, 2021. https://www.unodc.org/res/wdr2021/field/WDR21_Booklet_2.pdf.

United Nations Office on Drugs and Crime. "World Drug Report 2022 Methodological Annex." *Research and Trend Analysis Branch, UNODC, Vienna* (2022): 1-128.

United Nations Office on Drugs and Crime, "UNODC and Illicit Crop Monitoring, Accessed September 4, 2023. https://www.unodc.org/unodc/en/crop-monitoring/.

Universal Postal Union. "Postal Statistics." Last Modified 2021. https://www.upu.int/en/Universal-Postal-Union/Activities/Research-Publications/Postal-Statistics.

Universal Postal Union, "Postal Statistics 2022: Technical Notes," Last Modified 2020, VII. https://www.upu.int/en/Universal-Postal-Union/Activities/Research-Publications/Postal-Statistics.

United States Department of Justice: Office of Public Affairs. "*AlphaBay*, the Largest Online 'Dark Market,' Shut Down." *Justice News*, July 20, 2017.

United States Postal Service. "About the United States Postal Service." Accessed September 30, 2022, https://about.usps.com/who/profile/.

United States Postal Service Office of the Inspector General. "Audit Report: Use of Postal Service Network to Facilitate Illicit Drug Distribution." September 28, 2018; 1-36.

Vaccaro, Andrea. "Measures of State Capacity: So Similar, Yet So Different." *Quality & Quantity* 57 (2023): 2281-2302.

Van Buskirk, Joe, Naicker, Sundresan, Roxburgh, Amanda, Bruno, Raimondo and Burns, Lucinda. "Who Sells What? Country Specific Differences in Substance Availability on the Agora Cryptomarket." *International Journal of Drug Policy* 35 (2016): 16-23.

The World Bank. "GDP Per Capita Current US$." Accessed March 27, 2023. https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?end=2021&name_desc=true&start=2005.