

Université de Montréal

**Trust and Exchange: The Production of Trust in Illicit Online Drug  
Markets**

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Cette thèse intitulée:

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## RÉSUMÉ

Au cours de la dernière décennie, les marchés illicites en ligne sont passés de niches de marchés à plateformes économiques à part entière. L'un des aspects de cette expansion semble reposer dans l'abandon de l'articulation traditionnelle de la relation de confiance entre vendeurs et acheteurs pour l'adoption de transactions régies par les principes d'atomisation sociale et d'anonymat. Se situant au cœur d'une sociologie économique des marchés illicites encore émergente, cette thèse cherche donc à étudier l'élaboration de la confiance au sein des marchés de drogues illicites en ligne.

En m'appuyant sur la notion d'institutions en tant que constructions sociales, j'avance la thèse selon laquelle ces marchés illicites modernisent les modalités de transaction des marchés licites traditionnels : des contrats sont proposés ; des tribunaux sont érigés ; la sanction est formalisée ; et la gouvernance est transformée. Cette approche permet de révéler un schisme fondamental de la littérature et de ses postulats à l'égard de l'ordre social régnant au sein des marchés illicites en ligne – rupture qui s'exprime notamment par l'opposition entre 1) une conception de ces marchés comme socialement atomisés et régis uniquement par la réputation ; et 2) l'idée selon laquelle les serveurs restent sous le contrôle des administrateurs.

Afin de pallier cette discordance, je propose un modèle d'élaboration de la confiance notamment issu des approches cognitives et comportementales. Premièrement, je soutiens qu'un ensemble de mécanismes actifs de renforcement remplace fonctionnellement les principes sociaux traditionnels de la confiance. Deuxièmement, je soutiens que la confiance, aussi bien interpersonnelle qu'abstraite (à savoir, la confiance accordée aux institutions), est principalement produite selon un processus bayésien d'accumulation d'expériences.

Dans cette perspective, l'article « Uncertainty and Risk » examine l'ensemble des mécanismes actifs de renforcement de la confiance – première composante de ce modèle – et révèle que les vendeurs ajustent les prix non seulement en fonction de la réputation, mais également des contrats et du statut. Dans les articles suivants,

le processus bayésien d'accumulation d'expériences – deuxième partie du modèle – est abordé. L'étude menée dans l'article « Building a case for trust » met ainsi en lumière une association entre les échanges répétés avec le vendeur et une tendance à effectuer des transactions de plus en plus importantes. Le troisième article (« A change of expectations ? »), quant à lui, met en exergue le fait qu'un faible nombre d'expériences satisfaisantes suffit à augmenter la certitude de l'acheteur quant à la qualité du produit illicite. Dans leur ensemble, ces deux articles soutiennent l'idée selon laquelle le processus d'accumulation d'expériences favorise la coopération et les attentes.

Enfin, ce travail s'achève par l'articulation des deux composantes de ce modèle et, de manière plus générale, par l'articulation de la thèse de la modernisation et d'une conception de la confiance dont l'élaboration repose sur un processus d'accumulation d'expériences sociales. L'apport unique d'une sociologie économique dans l'étude criminologique des marchés illicites est notamment souligné et des pistes de recherches futures sont discutées.

**mots clés : confiance, sociologie économique, marchés illicites, cryptomarchés, marchés de la drogue, cybercrime**

## ABSTRACT

During the last decade illicit online drug markets have grown from niche markets into full-fledged platform economies. It seems that over the course of a few years, sellers and buyers have left the social bases of trust behind preferring to exchange under conditions of social atomization and anonymity. Situated in an emerging economic sociological approach to illicit markets, this work examines the production of trust in illicit online drug markets.

Drawing on economic sociology, namely, the notion of institutions as social constructions, I advance the thesis that these markets modernize the premodern exchange modes of traditional illicit markets: Contracts are implemented; courts are erected; sanctions are formalized; and governance transforms. This analysis reveals a fundamental schism in the literature and its assumptions about the social order of illicit online markets. Specifically, a conception of these markets as socially atomized and governed only by reputation, versus the recognition that servers remain under the control of administrators.

Building off the modernization thesis and the schism, I propose a model for the production of trust that is sensitive to both cognitive and behavioral approaches to trust. First, I propose that a set of active trust producing mechanisms functionally replace the bases of trust that have eroded as illicit markets move online. Second, I argue that trust is primarily produced through a Bayesian process of accumulating experience, which produces both interpersonal and abstract trust.

In the article *Uncertainty and Risk* I examine the first component, the active production of trust. I revisit a key debate in the literature, the pricing of illicit goods. We find that sellers set prices adjust prices not only with respect to reputation, but also contracts and status. In the following two articles, I examine the second part of the model, the bayesian process of experience accumulation. In the article *Building a Case for Trust*, I find that repeated exchanges with a seller are associated with a propensity towards larger transactions. In the third article, *A Change of Expectations?*, I find that even a few experiences increases expecta-

tions in the performance of the market institution. Thus, the two articles provide evidence that the process of experience accumulation promotes cooperation and expectation.

I conclude the work by reconciling a tension between the two components of the model, the proposition that markets are modernized, but that trust is produced primarily through a process of experience accumulation. On this basis, I continue to highlight the contributions and analytical advantages of the economic sociological approach to illicit markets.

**keywords** **Keywords:** trust, economic sociology, illicit markets, cryptomarkets, drug markets, cybercrime.

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*"I made a promise to complete this work. This promise is my flag planted in the future tense. It represents my commitment to construct a future that cannot come into being should I abandon my promise. This future will not exist without my capacity to first imagine the facts and then to will them into being. I am an inchworm moving with determination and purpose across the distance between now and later. Each tiny increment of territory that I traverse is annexed to the known world, as my efforts transform uncertainty into fact. Should I renege on my promise, the world would not collapse."*

Shoshana Zuboff, *The Age of Surveillance Capitalism*.



## CHAPTER 1

### INTRODUCTION

This dissertation is not about the trade in illicit drugs on the dark web. This is a dissertation about trust and exchange under conditions of illegality, a subject that epitomizes core issues of social theory. It is a dissertation about illicit markets, cooperation and co-existence outside the confines of the law, a diplomatic intervention into the criminology of illicit markets, and an incursion into a territory that has historically been ceded to economists (Bushway & Reuter, 2008). The dark web and drugs are a means to an end, a strategic research site, from which empirical study can contribute to an emerging economic criminology of illicit markets and the behavior of actors within them. The principal aim of this work is to contribute to the continual development of such a criminology, by studying the production of trust in illicit online markets.

#### 1.1 Criminology and illicit markets

A criminology of illicit markets already exists, though it is fragmented and divided (Moeller, 2018a). At one side stands the economic approach and its allies, wrestling with their concepts; institutions, rationality, information, risk, and signals, paying little attention to culture (Bushway & Reuter, 2008, 2011; Reuter & Kleiman, 1986). On the other side, sociologically and culturally inclined scholars decry the reductive tendencies of economics, at times presenting it as a caricature, or reducing exchange to noneconomic action, (Dwyer & Moore, 2010a, 2010b; Scott, Grigg, Barratt, & Lenton, 2017). In other words, the specters of "orthodox criminology", and its detractors, haunt the criminology of illicit markets (Ferrell, Hayward, & Young, 2015; Garland, 2001). Though the opposition to orthodox criminology is well justified, neither position is satisfactory. The study of illicit markets, no matter where they fall of the continuum between community and mar-

ket, is the study of both. One may emphasize either, but a cursory examination of the scholarship suggests that neither social relations nor economics can be ignored (Moeller, 2018a). A compelling theory necessitates both, and it is no surprise that works at this intersection, such as Adler's (1993) ethnography, *Wheeling and Dealing*, are appreciated by both positions.

An economic sociology of illicit markets is beginning to emerge, and it holds the potential to reconcile the two positions, regardless of what end of the continuum it is approached from (Beckert & Dewey, 2017b; Ladegaard, 2020). It hinges on recognizing some basic premises, which will require us to moderate assumptions about action and structure. In turn, the prize is that the divide can be bridged, and the territory can be reclaimed. The paradigm is emerging rapidly. Within economic sociology, Beckert and Wehinger (2013) has applied Beckert's (2009) concept of coordination problems, and a recent edited volume shows interdisciplinary scholarship in action (Beckert & Dewey, 2017b). Later works at the intersection of illicit online markets and sociology have brought this agenda online (Bakken, Moeller, & Sandberg, 2018; Ladegaard, 2020; Odabaş, Holt, & Breiger, 2017b; Tzanetakis, 2018b). Meanwhile, Scandinavian criminologists have sought to bridge theoretical gaps between economics, cultural criminology, and economic sociology, occupying a more modest position (Moeller, 2018a; Sandberg, 2012). It is within this emerging criminology of illicit markets this work is found, though it is not committed to either tendency.

Despite the promises of an economic sociology of illicit markets, and its explanatory and diplomatic potential, the territory occupied by economists should not be immediately ceded to economic sociologists. Economic sociologists tend towards maxims, description, and theorizing, and it is often hard to deduce causal relations (e.g. Beckert, 2009; Beckert & Wehinger, 2013; Fligstein, 2001; Granovetter, 2017). Economic institutions are social constructions; economic action is inherently social action; and exchange is always socially embedded – it is a frustrating endeavor to apply these quantitatively. And it would only be a mistake to leave the significant contributions of economic analyses behind in the dustbin of history (e.g. Adler,

1993; Reuter, 1984). Perhaps these concerns are why criminologists are cautious to adopt a pure economic sociological approach, often preferring to apply it with some restrictions (Moeller, 2018a; Moeller & Sandberg, 2015, 2019).

As a work, I intend for this dissertation not to be a retreat to sociology, but a criminological incursion. My aim is to develop what may better be understood as an economic criminology of illicit markets; an approach that is practical, stresses causal propositions, and synthesizes economics and sociology within a criminological framework to advance and occupy the domain of illicit markets. Thus, this work should be seen as part of this emerging paradigm, but with distinct priorities. I do not intend to reinvent the wheel. Rather, I seek to contribute through an integrative approach to the study of illicit markets. Nor do I intend to retreat into description or theorizing, but to apply, test, and demonstrate. To do so, I will study the bases of market order in the conditions most hostile to honesty and cooperation.

## 1.2 Why trust?

Trust is often referred to in platitudes. "Trust is a social lubricant", "trust is good, control is better", "trust but verify". Although these hold a kernel of truth, they are neither insightful for theory development, nor utile for empirical application (Möllering, 2005a). To be trusted feels good, it has concrete benefits, and those who break the law feel no different (Martin, Munksgaard, Coomber, Demant, & Barratt, 2020; Young & Haynie, 2020). To have a reputation for honesty, to be trustworthy, is something to be proud of (Denton & O'Malley, 1999), and it comes with material benefits (Dasgupta, 1988; Wendel & Curtis, 2000). At the micro-scale, it is a symptom of cohesion, prosocial norms, and solidarity (Simpson & Willer, 2015). Trust encourages risk-taking, to lend on credit, to assume honesty in future acts (Moeller & Sandberg, 2015). It reduces frictions in exchange, and social action in general, and lessens the need for excessive controls (Granovetter, 1985; Sztompka, 1999; Zucker, 1986). Yet, control and trust are not opposites

(Möllering, 2005a). Trust is a belief about what others can be expected to do, and control, informal or formal, may easily constitute good reasons to trust (Möllering, 2005a).

*”There is nothing like having your word be trusted [...] That actually means something.”* – Online drug dealer (Martin et al., 2020, p. 567).

At the macroscale, trust is associated with social cohesion, peace, solidarity, equality, and prosperity (Stolle, 1998; Uslaner, 2008). It is both symptom and cause of social function and cohesion (Zucker, 1986), while distrust and the erosion of trust are socially expensive and a symptom of dysfunction. Violence, social disintegration, and systemic changes breed distrust (Wu, 2020; Zucker, 1986), and it is no surprise that trust was one of the key concerns at the birth of social theory (Misztal, 1996, chapter 2). Yet, trust continues to hold great relevance as social structures grow more complex (Sztompka, 1999). The existence of institutions like money, political systems, and markets, is only rendered possible by trust, because it reduces social complexity (Luhmann, 1979). To face this complexity without trust would fill one with paralyzing dread (p. 5).

Trust also encapsulates the Hobbesian question of social order (Simpson & Willer, 2015), succinctly summarized in laboratory experiments wherein subjects who have never met begin collaborative endeavors (Kollock, 1994), disregard contracts (Simpson & Eriksson, 2009), and take leaps of faith to undertake collaborative endeavors (Gambetta & Przepiorka, 2019). How does this come about? Some suggest rational self-interest drives cooperation (Diekmann, Jann, Przepiorka, & Wehrli, 2014), even outside the confines of the law (Przepiorka, Norbutas, & Corten, 2017). Others suggest a modicum of institutional support is needed (Milgrom, North, & Weingast, 1990), and some see trust as produced by well-functioning social systems, habits, and routine – preferably produced intentionally (Misztal, 1996; Sztompka, 1999).

The Hobbesian question of how social order comes about, why man restrains himself from living out cold self-interest in pursuit of his own good, is the latent

theme in these discussions, but it is not restricted to sociology (Wrong, 1961). Rather, it is often an implicit assumption of social theory (Simpson & Willer, 2015), or the explicit departure thereof, as is the case for Beccaria (1764) who stated that "[each individual] will always endeavor to take away from the mass, not only his own portion, but to enroach on that of others". Tittle's (1995) control-balance theory of deviance, for example, relies on the assumption that humans are driven by a desire for autonomy, "escaping control over oneself and exercising more control over the social and physical world than one experiences" (p. 145). Similarly, Felson (2006) states that "crime is part of the larger struggles of nature, of survival and aggrandizement, as people abscond with the labor of others or seek to protect their own" (p. 351). Garland's (2001) separation of punitive and rehabilitative criminological ideals illustrates how these assumptions of the origins of social order not only undergird criminology, but also has concrete social implications, perhaps even more so than when sociologists debate the issue.

Thus, to study trust is to study social cohesion, the well-being of actors, the assumptions of social theory, and the bases of social order (Misztal, 1996). And it is to study how agency produces structure, and how structure shapes agency (Granovetter, 1985; Möllering, 2005b).

### **1.3 Trust in hostile conditions**

The problem of trust could not appear more pressing than among those who break the law. They cannot sign contracts, they cannot take complaints to a judge, their property rights are not secured, and the complexity of criminal networks and markets provide ample room for opportunism (Coomber & Moyle, 2017; Jacques, Allen, & Wright, 2014; Naylor, 2003). Nevertheless, despite the preconditions of disorder and distrust, those who trade outside the law frequently cooperate in relative peace (Adler, 1993; Reuter, 1984). What are the foundations of this social order? It seems that those outside law have solved the Hobbesian problem without a state, while social theorists have quibbled (Przepiorka et al., 2017).

The social order of illicit markets is supported by a surprisingly complex web of institutions that undergird exchange and support the emergence of stable worlds of exchange (Beckert & Wehinger, 2013). Scholars have stressed the productive function of social control, however brutal it may seem; the sanctioning capacity of reputation (Jacques & Wright, 2011); the regulating force of threats and violence (Dickinson, 2017); and the existence of informal regulators like the Mafia or insurgent groups (Aziani, Favarin, & Campedelli, 2019; Gutiérrez D. & Thomson, 2020; Reuter, 1984). That is, informal social control regulates deviant behavior in the absence of the law (Black, 1983), instituting some order without law (Ellickson, 1991; Jacques & Wright, 2008). At the same time, norms, solidarity, friendship, and community produce reciprocal relations and prosocial behavior (Moeller & Sandberg, 2019; Sandberg, 2012). So far, so good.

Recent decades have seen the emergence of illicit online markets, and though they have existed since the first days of the internet (Martin, Cunliffe, & Munksgaard, 2019, chapter 1), they have grown rapidly in the last decade (Soska & Christin, 2015), stolen data and drugs being the two key industries (Barratt & Aldridge, 2016; Hutchings & Holt, 2015, 2017). While traditional illicit markets appear like hostile conditions to trust and order, online ones seem even more so. The fundamental conditions introduced by the absence of the state; information asymmetry, and a lack of formal regulation, contracts, and courts, remain, but they are compounded as their functional replacement, informal social control, erodes (Moeller, Munksgaard, & Demant, 2017; Morselli, Décary-Héту, Paquet-Clouston, & Aldridge, 2017). Actors are disembedded from the traditional social contexts of illicit exchange; kinship, network, community, and friendship (Schoenmakers, Bremmers, & Kleemans, 2013; Scott et al., 2017; Steiner, 2017). Violence and threats appear impotent under conditions of anonymity and physical distance (Barratt, Ferris, & Winstock, 2016), and predation appears more likely absent social ties (Adler, 1993; Jacques et al., 2014). The Hobbesian question seems to have returned yet again.

So how come these markets emerge, grow, and persist? Scholars fundamentally

propose two solutions. Criminologists have emphasized social control, informal and formalized (Odabaş, Holt, & Breiger, 2017a). Administrators govern markets, set down rules, designate trusted actors, resolve disputes (Dupont, Côté, Savine, & Décary-Hétu, 2016; Lusthaus, 2012), and actors sanction each other through centrally organized repositories of reputation and gossip (Bakken et al., 2018; Morselli et al., 2017; Nurmi, Kaskela, Perälä, & Oksanen, 2017). Representing the other side, some sociologists and economists see these markets as evidence that social order can emerge absent "coercive force" through informal social control and reputation systems (Diekmann & Przepiorka, 2019; Eschenbaum & Liebert, 2019; Hardy & Norgaard, 2016; Przepiorka et al., 2017). And a smaller contingent of sociologists reduce the emphasis on self-interest, turning towards technology, community, and norms (Bancroft, Squirrell, Zaunseder, & Rafanell, 2020; Ladegaard, 2020; Masson & Bancroft, 2018; Tzanetakis, 2018b).

I take the position that this is, for now, a debate with limited empirical evidence, and which contains some incongruities. First, while cooperation and social order hinge on trust, trust cannot be reduced to behavior (Lewis & Weigert, 1985). Trust is both behavioral and a cognitive estimate (Sztompka, 1999), yet the literature has overwhelmingly emphasized cooperation (e.g. Décary-Hétu & Quessy-Doré, 2017; Norbutas, Ruitter, & Corten, 2020a; Przepiorka et al., 2017). Consequently, the cognitive dimension remains relatively unexplored outside qualitative research (Bakken et al., 2018; Bancroft et al., 2020; Tzanetakis, 2018b). Second, the literature has focused on reputation, giving sparse attention to the productive function of power (Décary-Hétu & Dupont, 2013; Odabaş et al., 2017a). These two reduce trust to a relational and calculative problem (Möllering, 2005b); the comparison of reputation scores, the existence of contracts and administrators, and fail to take into account that trust is not a static disposition (Hardin, 1993). Trust is, at the individual level, a cognitive Bayesian process in which structure and experience come together to produce an estimate of the future upon which the bet of trust is made (Sztompka, 1999). Recent research provides support for this thesis (Décary-Hétu & Quessy-Doré, 2017; Norbutas et al., 2020a), and I continue in this path, observant

of both the productive function of administration and the cognitive dimension of trust.

### 1.3.1 Trust and crime

The practical relevance of trust may appear vague to the applied researcher, but like the Hobbesian question, it holds significant relevance for criminological inquiry. To begin with, law enforcement has already recognized this, explicitly prioritizing the undermining of interpersonal and institutional trust in their interventions against illicit online markets (Europol/EC3, 2019; New Zealand Police, 2016; RCMP, 2016). Given the centrality of trust to exchange outside the law, this is fundamentally an attempt to make the market fail (Akerlof, 1970; Moeller, 2018a).

Illicit online markets are remarkably resilient, despite their centralization and public nature (Aldridge & Décary-Hétu, 2016; Décary-Hétu & Giommoni, 2017; Van Buskirk, Bruno, et al., 2017; Van Buskirk, Roxburgh, Farrell, & Burns, 2014). Seeking to illuminate the stability of the institution, not individual organizations, Norbutas, Ruiter, and Corten (2020b) suggests that the transferability of reputation is crucial, and that this is supported by the adoption of cryptographically verifiable identities. These ensure that on the disappearance of a market, sellers remain in possession of their accrued reputation. Ladegaard (2020) extends this thesis, arguing that the unintended consequence of law enforcement intervention has been the adoption of these identities and an ensuing social stability. Solidarity and cohesion are emphasized as well, by scholars who note the ability to, despite anonymity, retain community in the face of adversity (Bancroft et al., 2020; Ladegaard, 2018b).

In the shadows, trust has been argued to be instrumental in collaborative endeavors, co-offending (Gambetta, 2009). Consequently, a reputation for honesty and integrity holds monetary and personal value in illicit markets (Adler, 1993; Dasgupta, 1988; Denton & O'Malley, 1999). Similarly, the resilience and function of illicit networks are often ascribed to trust (Malm & Bichler, 2011; Malm,



Bouchard, Decorte, Vlaemynek, & Wouters, 2017; Moeller, 2018a; von Lampe & Johansen, 2004). Yet, under the absence of formal institutional support, regulations, laws, and courts, the social bases of stable worlds of exchange (Fligstein, 2001), those outside the law are forced to adopt the simplest premodern trust devices (Beckert & Wehinger, 2013).

Trust therefore figures as a latent expression of the Hobbesian question, but also as a critical component in endeavors beyond the law. A lack of trust restricts broad and networked social action, and interpersonal trust is crucial to small cooperative endeavors. When trust and honesty are plentiful, credit can be extended, and cash can swiftly be exchanged for product (Moeller & Sandberg, 2015, 2017). Cohesion and prosperity can emerge even outside the law (Adler, 1993). The study of trust is therefore also the study of the potentiality of crime and its social restrictions.

### **1.3.2 Aims and contribution**

Thus, the aim of this dissertation should now be clear. I will study the production of trust in what appears the most hostile conditions, the social atomization of illicit online markets. To do so, I revisit economic sociological tenets, and integrate them within a body of literature on illicit markets. I also draw attention to weaknesses in current applications, namely, the tendency towards functionalism inherited from the transaction cost framework, and an unexploited potential of institutional approaches in economic sociology. Beyond the analysis of trust and illicit online markets, this work is both a response, and attempt at building upon, an emerging criminology of illicit markets that draws on economic sociology. I radicalize some arguments, oppose others, suggest alternative approaches to a few, and subject the emerging paradigm to some criticism.

Drawing on social control theory I combine the economic sociological concepts of marketness and institutions as social constructions with the criminological literature on the governance of illicit markets. This framework constitutes the point of departure for my analysis of trust in online drug markets. I argue that illicit online markets constitute a modernization of the premodern exchange modalities of illicit

markets. This change may be understood in a similar manner as the transition to capitalism, and consequently necessitates revisiting our notions of how trust is produced in illicit online markets. Building on the criminological scholarship on illicit online markets I draw attention to a schism in how scholars conceive of the social order of illicit online markets as either atomistic and unrestrained by coercive force, or subject to strict internal control. Based on these two discussions, I propose a model of trust production that is sensitive to both structure and agency, and which combines the notion of active trust production, institutional sources of trust, with the recognition that trust is a Bayesian cognitive process at the individual level. Through three papers I subject the model to empirical scrutiny. The first paper examines the productive function of administration in reducing uncertainty, while the latter two provide evidence that the accumulation of experience produces both interpersonal and abstract trust. Based on these findings, I argue that the production of trust in online drug markets is an active process of social integration against an institutional backdrop, a perspective that is also capable of addressing the problem of power.

### **1.3.3 Structure of the dissertation**

In Chapter 2, I introduce the economic sociological approach to illicit markets and discuss the social and economic organization of illicit markets. I emphasize the social embeddedness of exchange, coordination problems, and the social construction of institutions as key concepts. These are deployed in the following two chapters, which treat illicit online markets and trust. In Chapter 3, I review the literature on illicit online markets. In doing so, I draw on social control theory and economic sociology. I deploy these to propose an ideal typical differentiation of illicit online markets. The chapter concludes with a review of the literature on cryptomarkets, online drug markets, the empirical domain of this study, and a discussion of them as social constructions. Here, I draw on recent innovations in economic sociology. In Chapter 4, I define trust problems in exchange relations, discuss the sociological conception of trust, how trust is produced, and how to measure

it. In Chapter 5, I turn towards illicit online markets, specifically cryptomarkets. Building on the preceding three chapters, I present an analysis of the production of trust in illicit online markets. Hereafter, I discuss the two key mechanisms I will examine, the active production of trust and experience. I conclude the chapter by outlining the research agenda. In Chapter 6, I present the methodological approach of the dissertation. In addition to discussing data collection and processing, I emphasize the assumptions that underlie my approach and the priorities of the research designs applied in the empirical work. I conclude by contextualizing the three empirical papers with regards to these priorities and the overall research agenda.

In Chapters 7, 8, and 9 I present three empirical papers in which I study the production of trust in illicit online markets. The first paper, *Risk and Uncertainty: How Actors Set Prices in Online Drug Markets* examines price formation with the aim of illuminating on the active trust production of centralized governance. In the second paper, *Building a Case for Trust: Exchange Relations and Risk-Taking in Illicit Online Markets*, I examine both cooperation and experience, hypothesizing that experience with a seller, and institutional support for trust, are conducive to undertaking increasingly risky endeavors. In the third paper, *A Change of Expectations? Generalizing Trust in Illicit Online Markets*, I leave the active production of trust behind. Instead, I examine whether experience is conducive to the production of general expectations, abstract trust. Finally, I conclude the work by summarizing the analysis of the production of trust, and reconciling an inherent tension within my model of trust production. I also draw attention to the insights generated using the economic sociological approach, and make some final suggestions for future research on trust in illicit online markets.

## CHAPTER 2

### ILLICIT MARKETS

Historically, the study of illicit markets has been "dominated by economists" (Bushway & Reuter, 2008, p. 424). Although there is ample criminological research on illicit markets, namely drug markets, the literature is fragmented and scattered across research agendas (Ritter, 2006). Condensing the current state of the literature, Moeller (2018a) argues that whereas criminologists have studied individual markets, formalizing and theorizing about the market has been left to economists (see also Beckert & Dewey, 2017b). Topics that occupy criminologists are instead the violence associated with markets (Jacques & Wright, 2008), typologies of market-related crimes (Naylor, 2003), predation (Jacques et al., 2014), normalization of otherwise deviant behavior (Coomber, Moyle, & South, 2016), and the social relations within markets (Bichler, Malm, & Cooper, 2017; Taylor & Potter, 2013). The market, as an arena of exchange, however, is left untheorized and Moeller (2018a) concludes that there "is no criminological theory of illicit drug markets" (p. 192).

The economic approach to illicit markets has been criticized for its reductionism and rigid assumptions (e.g. Dwyer & Moore, 2010a, 2010b). A recent tendency within criminology has sought to reconcile the economic perspective with ethnographically inclined analyses by drawing on economic sociology (Moeller & Sandberg, 2019). Within this tendency, Moeller (2018a) argues that fundamental economic sociological propositions are more easily reconciled with criminological research than the traditional economic frameworks, namely, the transaction cost framework (Reuter, 1984; Reuter & Kleiman, 1986). Simultaneously, economic sociologists have entered the fray from the outside (Beckert & Dewey, 2017a; Beckert & Wehinger, 2013; Tzanetakis, 2018b).

My contention, is that the fragmented criminology of illicit markets operates on a set of assumptions that are shared with economic sociologists. Put bluntly,

I suggest that the economic sociological approach to illicit markets is not particularly novel. Rather, it makes some latent assumptions explicit, which is a useful analytical tool. The effort of this chapter is therefore integrative, rather than developmental, and it is perhaps more fitting to define the framework I sketch out as "economic criminological", rather than sociological. This is an argument I will open in this chapter and discuss in the conclusion of the dissertation. My priority is to sketch out these shared assumptions, render them explicit, show their compatibility and similarity, and conceptualize illicit markets and exchange in relation to these. The absence of a criminological theory of illicit markets necessitates that the vocabulary is drawn primarily from economic sociology, but my contention remains that these are latently assumed in scholarship in general, and that the application of economic sociology is principally the task of rendering them explicit. The aim of the chapter is thus two-fold. I will introduce and define illicit markets, and I will present an integrative account of illicit markets that uses economic sociological concepts to synthesize a body of criminological scholarship.

When introducing theory, one may either rigorously separate theory and application, but the problem is then what to put first. A general description of concepts such as "social embeddedness" or "hierarchy", while informative, is best understood through examples. Thus, as I introduce central theoretical concepts, I rigorously seek to relate them to practical examples. However, I will minimize comparisons to illicit online markets, saving these for the forthcoming chapters. Throughout the chapter, I also take caution to not invoke the term trust. Although the concepts I draw on, and the mechanisms and organizations I refer to, both produce and sustain trust, the discussion of trust necessitates a framework that can be referred to. Thus, in the following chapters I tie these together. Only later will the tools necessary to understand trust in illicit online markets be at disposal.

The chapter is organized so that I begin at the macro-level and progress towards the micro-level of illegal exchange. I begin by first introducing theoretical frameworks for understanding illicit markets, namely the risks & prices framework, its detractors, and the emerging economic sociological paradigm. Here, I high-

light three propositions of classical economic sociology around which the following sections revolve. It is these propositions that I suggest are latent assumptions of scholarship. I then define illicit markets at the macro-level and discuss their relation to the state. I then proceed towards the meso-level, discussing how to conceive of individual markets, hierarchies, networks, and organizations. I then proceed to discuss individual action, and what distinguishes exchange as a crime. Given the different scope of theoretical approaches, the centrality of criminology grows as the scope narrows towards the micro-level of exchange as a crime. I conclude with a discussion of the framework and specify some theoretical focal points and assumptions, which will undergird the remaining work.

## 2.1 Conceptualizing illicit markets

Illicit markets are not like other markets. They are distinguished by types of social organization and modes of exchange that at times hardly resemble markets at all: Exchange and cooperation are frequently embedded in ties of kinship and friendship (Bourgois, 2003; Schoenmakers et al., 2013; Scott et al., 2017; Steiner, 2017), profit is not the sole concern with prosocial attitudes, status, and noneconomic motivations sometimes taking priority (Belackova & Vaccaro, 2013; Denton & O'Malley, 1999; Sandberg, 2008), and organizations are frequently observed to be fluid network-like structures (Bright & Delaney, 2013; Morselli & Roy, 2008; Natarajan, Zanella, & Yu, 2015; Reuter, 1984). In fact, one may go so far as to argue that illicit markets more closely resemble premodern economies – bazaars, barter-, or gift economies – than they modern resemble modern markets (see for example Fanselow, 1990; Geertz, 1978; Tilly, 2005, for examples of such economies).

Although scholars operate from the same baseline observation, that illicit markets are heterogeneous, dynamic, and networked, there is considerable variety in how they, and the actors within them, are conceptualized. Two general approaches to illicit markets exist within criminology (Moeller, 2018a). One emphasizes their inherent social nature (e.g. Scott et al., 2017), whereas another takes an economic

approach. The risks & prices framework, the most consistently utilized economic approach, relies on transaction cost economics (Reuter, 1984; Reuter & Kleiman, 1986), a more moderate version of neoclassical economic approaches (Williamson, 1981). Fundamentally, the risks & prices framework is concerned with enforcement and its consequences, namely, as observed through price. Reuter and Kleiman (1986) present the thesis in an essay probing the question why drug prices in the US have continued to fall despite significant law enforcement. The economic approach is also related to deterrence theories, from which the emphasis on prices follows (Bushway & Reuter, 2011). While generally taken to be based on a transaction cost framework (e.g. Moeller, 2018a), Reuter and Kleiman (1986) presents the thesis in relatively atheoretical terms and do not discuss transaction cost economics. The tendency is more pronounced in *Disorganized Crime*, wherein Reuter (1984) uses industrial organization economics. Arguably, however, the economic tendency is latent throughout the work of the school, which has occupied itself with concepts like information asymmetry, demand and price elasticity, purity, and product types, in addition to prices (e.g. Ben Lakhdar, 2009; Ben Lakhdar, Vaillant, & Wolff, 2016; Caulkins, 2007; Reuter & Caulkins, 2004). While these are predominantly questions treated by economists, it is important to recognize their impact within the criminology of illicit markets at large which to a very large extent revolves around, or draws heavily upon, the economic analyses, assumptions and explanations (e.g. Adler, 1993; Bushway & Reuter, 2008; Moeller, 2018a; Moeller & Sandberg, 2019).

The social approach does not have an overarching theoretical framework, but tends to apply ethnographic and qualitative methods and draw on Bourdieu, as well as the notion of social embeddedness. For example, Dwyer and Moore (2010a) illuminates the complex social processes of exchange in an Australian street drug market, in which social ties and culture shape market activities. Similarly, scholars like Bourgois (2003) and Sandberg (2008) draw on Bourdieusian theory to show how concerns like status motivate drug dealers, whereas Scott et al. (2017) argue that the exchange of drugs in peer networks, social supply, is better captured by the

notion of "community" than "market". Generally, these approaches remain skeptical of economic reductionism and are perhaps best united by this skepticism.

At times, economic approaches are reduced to a caricature that assumes **a**) perfectly rational utility maximizing actors, **b**) socially disembodied transactions, and **c**) perfect distribution of information; the basic assumptions of neoclassical economic theory (Dwyer & Moore, 2010a, 2010b). Contrary to these, contemporary economic approaches, at least in the study of illicit markets, tend to be more moderate. Neither perfectly rational utility maximizing actors, perfect information, nor socially disembodied actors are assumed (see Moeller, 2018a, for a general critique). For example, within the risks & prices framework, perfect information is not assumed (Reuter & Caulkins, 2004), and it is acknowledged that drug markets do not abide to rigid economic preconceptions (Reuter & Caulkins, 1998). Similarly, studies by Ben Lakhdar (2009) and Caulkins and Padman (1993) have produced informative econometric analyses of drug prices that are attentive to the problem of information. In fact, the risks & prices framework may be interpreted as a challenge to economic approaches and a continuous negotiation between empirical research and theory, rather than the application of naive economics to illicit markets (Reuter & Kleiman, 1986). For example, Reuter's (1984) thesis, that illicit markets are generally disorganized and not subject to hierarchical control, could be seen as critical to conclusions that may be drawn from economic reasoning (see also Moeller, 2018a).

Moeller (2018a) argues that the tension between the social and economic approach to illicit markets may be resolved by drawing on economic sociology, namely, the concept of "social embeddedness". Specifically, Moeller (2018a) argues that transaction cost economics and economic sociology are reconcilable, but that the latter is more sensitive to interpersonal relations and trust. This introduces a tension, however, since economic sociology and the concept of embeddedness was specifically developed as a critique of the transaction cost framework (Granovetter, 1985; Swedberg & Granovetter, 1992). Nevertheless, this may be seen as a step towards developing a theoretical framework that can synthesize a fragmented body



of research. In the following sections, I return to some basic propositions and assumptions of both economic sociology and transaction cost economics. My aim is to define, delimit, and discuss illicit markets while situating them in a theoretical framework. To do so, the chapter revolves around four propositions drawn from economic sociology:

1. Illicit markets exist in relation to the state.
2. Institutions are social constructions.
3. Economic action is social action, and it is embedded in arenas of exchange.

These propositions will guide the following sections as I define and discuss how to conceptualize illicit markets and exchange at the macro-, meso-, and micro-level.

## **2.2 Illicit markets and the state: Legality and legitimacy**

At the macro-level, illicit markets exist in relation to the state. There are moderations upon this theme; illicit markets as existing in opposition to (Moeller, 2018a), or as produced by the state (Beckert & Dewey, 2017b). Markets become illicit when they are illegalized, that is, when a state defines the market activities associated with the production, distribution, possession, and consumption of goods and services as illegal. Consequently, some scholars highlight the illegalization of exchange as the defining element of illicit markets, which are argued to otherwise be an ordinary human occupation (e.g. Brooks, 2020). Thus, the defining characteristic of illicit markets is their relation to the state, specifically, the designation of some acts as illegal.

Illicit markets therefore do not emerge spontaneously, but are rather brought into being through a social process in which the state is the principal actor. Steiner (2017), for example, shows how throughout the 1980's and 1990's, organ transplants became a contentious topic and was sought decommodified through illegalization. There are varieties of illicit markets, and Beckert and Dewey (2017b) propose two

useful axes, legitimacy and legality. These allow differentiating between illicit markets as they relate to the state and society. On the normative axis of legitimacy, goods fall somewhere on the continuum between taboo and perfectly socially acceptable. That is, are the goods and services broadly considered morally reprehensible, such as organs or child sexual exploitation material, or considered minor deviances, like the sale or purchase of sexual services or cannabis. For example, Antonopoulos (2008) suggests social acceptance, the axis of legitimacy, as the cause of the high prevalence of illicit tobacco consumption in Greece<sup>1</sup>.

The other axis is legality, the law and its enforcement. Products, goods, and services are rendered illegal in different ways. The criminalization of possession, exchange, and consumption will all vary, and in some cases, such as decriminalization, products may be illegal, yet the law unenforced. Illicit goods and services vary across these, encompassing as diverse classes as drugs, sexual services, organs, counterfeit goods, stolen items or data, and endangered animals. Illegality comes in different forms, and should not be seen as a binary, nor necessarily as a continuum. Both Beckert and Dewey (2017b) and Naylor (2003) highlight that different aspects of market-based crimes are illegal: The product may be illegal by definition (illegal drugs, child sexual exploitation material), possession of it may be (stolen data, stolen goods), exchange may be illegal (counterfeit goods, sexual services), and regulation may be violated (reselling prescription medicine, importing cigarettes without paying taxes). Consequently, a range of offenses may be involved in an market crime, and goods and services may be classified along these. Drugs, for example, typically fall at the extreme end, being illegal in every sense, whereas insider trading is only illegal by breaking regulation. Conversely, the exchange of illicit firearms is often found between. For example, legal and regulated deactivated firearms, so-called "alarm weapons", can be activated and rendered illegal (Hellenbach et al., 2018). Alternatively, legally purchased firearms can be resold outside regulatory limits, or stolen and resold (Cook, 2018; Morselli & Blais, 2014). The

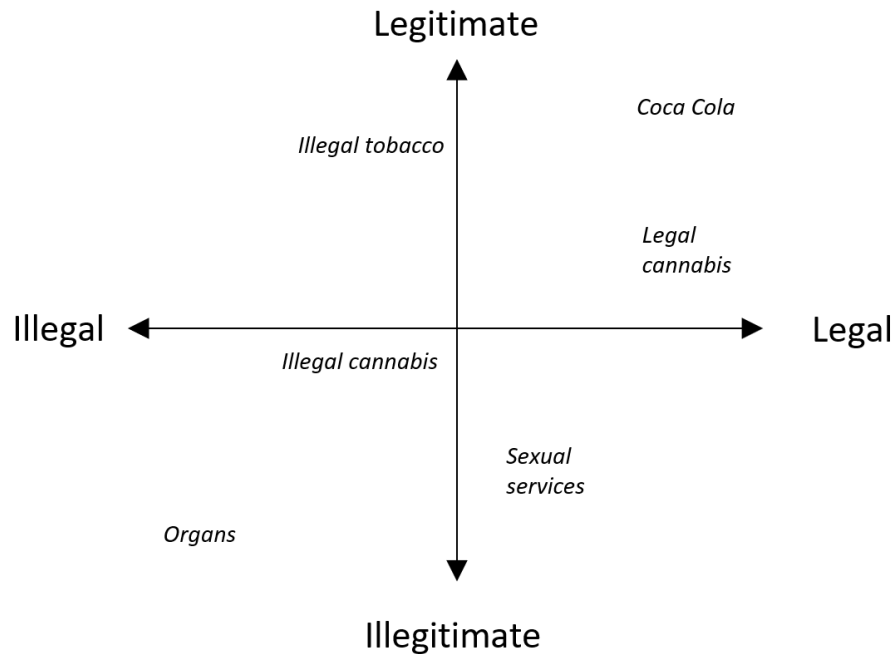
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<sup>1</sup>There is a obvious overlap between what Beckert and Dewey (2017b) denote as legitimacy and the concept of deviance. This is discussed later when conceptualizing exchange as a crime.

work of Naylor (2003) and Beckert and Dewey (2017b) may be qualified further, by the degree of illegality/criminalization. For example, the US Anti-Drug Abuse Act of 1986 established different sentencing procedures for crack and cocaine, wherein 1 gram of crack was sentenced as 100 grams of cocaine (Alexander, 2012, p. 112). Though crack is, put simply, cocaine with baking soda, one was penalized much harsher than the other (L. Davis, 2011). Thus, some, or all, market actions can be illegal, and to varying extents.

The normative legitimization and delegitimization of products and services, the construction of them as taboo or morally reprehensible, is tightly woven into the designation and constitution of illegalized exchange. It may be a consequence thereof, or a longer social process that precedes illegalization. For example, Skilbrei (2001) describes a decade-long process of politicians and media constructing "imagined massage parlours being a place where really young girls work as prostitutes, the women being a source for the spread of HIV/AIDS and a nest of organized crime" (p. 70). A discourse which was followed by stigmatization and enforcement. Similarly, Ayres and Jewkes (2012) detail how media portrayals of methamphetamine users as "deformed and disfigured faces" had similar effects (p. 315). The notion is also evident with Reuter (1984), who argued that the framing of illicit exchange as organized by the Mafia shaped policy and public perception contrary to empirical reality: "The mistake has been to assume that there were general characteristics of organized crime rather than a particular historical experience" (p. 185). Naylor (2003) suggests this process is driven in part by the "secondary crimes" associated with illicit markets; violence, fraud, predation, and so forth. In this sense, states and other actors create illicit markets which exist in relation to them. Thus, the state is constitutive of illicit markets, both through illegalization and their delegitimization (see also Adler, 1993; Naylor, 2003; Reuter & Kleiman, 1986).

In both the case of organs and sexual services, goods were repositioned through a social process of delegitimization. A similar case in the opposite direction is the "normalization", legitimization, of drug consumption and selling, closely intertwined with increased consumption and between-peer distribution (Coomber et al., 2016;



**Figure 2.1** – Differentiation of illicit markets based on legitimacy and legality (Beckert & Dewey, 2017b). Examples are based on studies referenced.

Parker, Williams, & Aldridge, 2013). Legitimization/delegitimization and criminalization/legalization are correlated and will vary across time and space (Beckert & Dewey, 2017b). The differentiation may be conceived of as shown in Figure 2.1, wherein some of the goods and services discussed are plotted as examples.

The axes of legality and legitimacy defined by Beckert and Dewey (2017b) and shown in Figure 2.1 are comparable to distinctions between deviance and crime, though they are restricted to market exchange which is argued to be under-scrutinized and -theorized as a category of crime (Moeller, 2018a; Naylor, 2003). The basic understanding of crime as social action, however, follow a similar structure and reasoning as among criminologists: Crime is defined in relation to the law, it is socially constructed, and will vary across time and space (e.g. Bjørge, 2016; Felson, 2006). Such definitions correspond to what Beckert and Dewey (2017b) denote the continuum of legality, the degree to which a market activity is criminalized, sanctioned, punished, and so forth. Conversely, deviance is defined by its relation to social organization and norms, as varying across time, space and

groups, or as a general frame of reference for whether social action is considered perfectly legitimate or morally reprehensible or somewhere in between (e.g. Matza, 2009; Tittle, 1995, 2004). That power and politics intersect with the designation of deviance not novel either (Becker, 1963). Thus, the legitimacy/legality distinction is therefore, in broad strokes, analogous to the distinction between deviance and crime. If a difference should be highlighted, it is whether the continuum is treated explicitly as such, the Weberian origin of the legitimacy concept, and what analytical level it is deployed at. With these reservations in mind, legitimacy may be replaced by deviance in Figure 2.1.

Within the economic sociological approach the state is central to illicit markets. This role may be seen as an extension of the role typically ascribed to the state in institutional strands of economic sociology (e.g. Beckert, 2009; Fligstein, 2001; Fligstein & Dauter, 2007). Situating this notion within criminology, Moeller and Sandberg (2019) make an important distinction in a study of drug prices which they argue are constrained by a formal institutional context; regulation, policing, and law. Thus, whereas economic sociology emphasizes the state as crucial in the establishment of market order, at times so much that illicit markets are by definition considered disorderly (Fligstein, 2001, p. 33), the function of the state is inverse for illicit markets. These are constrained, rather than supported, by the formal institutional context. In this sense, criminalization, enforcement, and policing of illicit markets are the inverse of state regulation of licit markets.

The role of the state in producing illicit markets through law is captured in some classic examples. First, the current opioid crisis in the United States has been argued to be the unintended consequence of lax regulation of prescription drugs with addictive potential (Ciccarone, 2019). Lax regulation and a lack of supervision allowed the overprescription of opiates, which then led to chronic use and addiction (Madras, 2017; Van Zee, 2009). As regulation was imposed, users sought out the next best alternatives to their doctor, counterfeit and diverted medicine, or the chemical brethren of opiates, heroin (Martin, Cunliffe, Décary-Héту, & Aldridge, 2018). A second example is the Afghan heroin production. Afghanistan has tra-

ditionally been the primary producer of opium, which is typically processed into heroin in neighboring countries. However, through harsh enforcement the Taleban regime succeeded in reducing the production to an extraordinary low level (Ciccarone, Ondocsin, & Mars, 2017). Today, following the Afghanistan War, opium production has again resumed. Finally, a classic example is alcohol prohibition in the United States, a policy which criminalized an everyday occupation and which allowed organized crime to grow (Demleitner, 1994; Hall, 2010; Reuter, 1984).

Thus, at the macro-level criminologists and economic sociologists emphasize the state and criminalization/delegitimization as crucial to illicit markets. Importantly, neither assumes law is constrained to a binary legal/illegal distinction. Rather, the implementation of law, exemplified in cases such as the cocaine/crack discrepancy (L. Davis, 2011), shapes and constrains markets. Different actions may be illegal (e.g. production, consumption, distribution), and they may be so to varying degrees. This dimension constitutes what Moeller and Sandberg (2019) denote a formal "institutional constraint" on illicit markets and the actors within them (p. 311). Through rendering certain, or all, acts within a market illegal the state therefore produces it (Naylor, 2003). When approached as such, there is therefore little disagreement between the approaches, when it comes to the role of the state in terms of legality and legitimacy. Rather, the difference is found in disciplinary foci and points of emphasis. Criminologists tend to study individual markets and firms above theorizing (Bichler et al., 2017; Moeller, 2018a; Naylor, 2003). Economic sociologists occupy themselves with social processes of illegalization and delegitimization (Beckert & Dewey, 2017a). Conversely, criminological research emphasizes the constitutive and productive role of law and enforcement, for example in Naylor's (2003) typology or the risks & prices framework (Boivin, 2014; Bushway & Reuter, 2011; Moeller, 2018a). At the macro-scale, the assumption that the state is constitutive of illicit markets, and that it actively produces them, is therefore recognized by either position. The advantage of the economic sociological apparatus is the explicit role granted to the state when understanding market order, but it remains latent within criminological research.

### 2.3 Illicit markets as institutions

The second economic sociological tenet of interest is the notion of economic institutions and modes of organization as social constructions (Swedberg & Granovetter, 1992). Institutions are, from this perspective, not necessarily formal institutions, like a parliament or court system, but stable patterns of "shared rules, which can be laws or collective understandings, held in place by custom, explicit agreement, or tacit agreement" (Fligstein, 1996, p. 658). Examples from the licit economy are industrial similarities or labor market structures (Fligstein, 2001; Uzzi, 1997).

The challenge at this level is to explain how economic institutions come to be, and how they become persistent, almost immovable, social structures (Granovetter, 1992). For example, how come labor markets vary so widely across nations (Fligstein, 2001, p. 101)? In the study of illicit markets, the question is why they, and organizations within them, are heterogeneous despite similar institutional constraints. For example, why some markets are violent (Levitt & Venkatesh, 1998), or why some are peaceful (Hirata & Grillo, 2019). However, both Moeller (2018a) and Naylor (2003), argue that criminologists are generally occupied with individual markets (e.g. a street market), or with secondary crimes (e.g. predation, violence, theft), rather than this dimension. Nevertheless, the problem is pressing; why do markets and organizations within the same, or highly similar, institutional constraints exhibit such heterogeneity? One example of where this problem of explanation is pressing is in the organization of illicit networks. Here, a key discussion is why social networks of criminal entrepreneurs take different forms. Scholars are divided however, on whether, and how, networks evolve over time. The dominant view is that these respond to external pressures, promoting a balance between secrecy and efficiency (Bichler et al., 2017).

Economic perspectives may suggest that such institutions are outcomes of competitive processes, evolution, or cost reduction (Williamson, 1981), whereas, economic sociologists will argue that these causes lacks explanatory power (Granovet-

ter, 1992). This position is a reaction to both economics in general, and the transaction cost framework in particular, which in part seeks to explain institutions as well (Williamson, 1973, 1981). In the following two sections I will discuss the organization of illicit markets. Though this discussion may be considered as overly theoretical, implicit or explicit assumptions of the social processes that shape illicit organizations and institutions are crucial. A point that is illustrated in the varying levels of violence associated with different markets and organizations (Hirata & Grillo, 2019; Jacques & Wright, 2008; Reuter, 2009). Similarly, the thesis that uncertainty necessitates hierarchy may be seen as the root of what Reuter (1984) argues is a misconception of the role of organized crime in illicit markets as violent exploitative, and powerful hierarchies (see also Moeller, 2018a).

### 2.3.1 Markets, hierarchies, and networks

Williamson’s transaction cost framework, which undergirds much of the economically inclined scholarship on illicit markets, makes two assumptions that moderate neoclassical economics, with the aim of explaining different modes of economic organization. Fundamentally, the puzzle that is sought resolved is why some transactions are within hierarchies, while others are in a market. Beginning with the transaction as the primary object of interest, Williamson introduces two assumptions. First, it is acknowledged that rationality is bounded; “boundedly rational agents experience limits in formulating and solving complex problems and in processing (receiving, storing, retrieving, transmitting) information” (Williamson, 1981, p. 553). Second, some actors are inclined to opportunism and will cheat, break promises, and so forth. Both assumptions introduce frictions to transactions by creating uncertainty (Dow, 1987)<sup>2</sup>. To resolve these uncertainties, hierarchies emerge to govern transactions, instead of markets, because actors economize (i.e. minimize) transaction costs (Williamson, 1981). Such hierarchies may be the vertical integration of firms, or the use of contracts.

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<sup>2</sup>Uncertainty is a critical concept for understanding trust, and will be explored in further detail later.



Neither opportunism nor bounded rationality are alien to criminology, which has treated individual rationality at length, and frequently observes opportunism (e.g. Jacques, 2010; McCarthy, Hagan, & Cohen, 1998). Naylor (2003), for example, differentiates profit-driven crimes with reference to force and fraud, both of which can be opportunistic (e.g. ripping off another criminal). Similarly, the boundedness of rationality, is a baseline assumption when studying markets wherein the quality of goods cannot be ascertained (Adler, 1993), or when the rational decision-making of offenders is discussed (Moeller, Copes, & Hochstetler, 2016). Since illegality involves an absence of formal institutional regulation, namely contracts and courts, opportunism is unrestrained (Bouchard, Soudijn, & Reuter, 2020). This would therefore suggest that hierarchical structures emerge and dominate illicit markets.

The archetypal hierarchy is the firm or enterprise, and in illicit markets it may be more loosely considered as associations of collaborators (see also Reuter, 1984, chapter 5). For example, Herley and Florêncio (2010) suggest that the rampant opportunism in an a stolen data market incentivizes serious players to operate in closed networks, and insulate themselves from **a**) lack of information, the boundedness of rationality, and **b**) opportunism. In line with the transaction cost approach, hierarchical organization therefore emerges to resolve the frictions that arise from bounded rationality and opportunism (Williamson, 1973). The consequence of hierarchies, however, is that they are less efficient economically. For example, by operating in a closed network, the pool of potential partners is reduced and price competition is impeded (Moeller, 2018a).

Within the risks & prices framework, which builds on transaction cost economics, the central question is why drug prices are so high, sometimes higher than gold or silver. Production costs are minimal and so are transportation costs (Reuter & Kleiman, 1986). Scholars posit that risk is the driving factor in price formation because it introduces uncertainty (Caulkins & Reuter, 2010). Actors are at risk of opportunism from other actors within the market (Jacobs, Topalli, & Wright, 2000), and there is an incalculable risk of law enforcement intervention. This introduces nonmonetary risks, such as arrest or death (Levitt & Venkatesh, 1998),

and a "risk tax" is incorporated to compensate for these (Caulkins & Reuter, 2010, p. 216). Thus, labor costs increase because of risk, which is one of the guiding principles of drug enforcement (Bushway & Reuter, 2011).

The risks & prices thesis was originally developed to explain why continued enforcement did not yield the expected benefits, for which the formula was simple: Increased enforcement yields an increase in price which reduces demand. However, Reuter and Kleiman (1986) reached the conclusion that, namely, the inelasticity of demand (its unresponsiveness to price), the prevalence of drug markets, and the focused enforcement on production, for which costs are low, make drug markets, and use, hard to limit. Further extensions have highlighted that the risk tax shapes social action more specifically, for example, by motivating expediency and extending credit. Inventory costs arise as the storage of large quantities is a continuous risk. Consequently, dealers are inclined to discount drugs, if they can minimize the time they are in their possession (Moeller & Sandberg, 2019). Sometimes, drugs may even be "fronted", sold on credit, with payment deferred until they have been sold by the debtor (Moeller & Sandberg, 2017). In turn, this explains the varying quantity discounts in legal and illegal drug markets, because an increasing risk motivates expediency and thus a steeper quantity discount (Smart, Caulkins, Kilmer, Davenport, & Midgette, 2017).

Turning towards the structural and organizational level, the structure of illicit markets is frequently observed to be a function or response to law enforcement interventions. For example, Boivin (2014) finds that the risk tax is primarily driven by risks imposed at the export stage, rather than street level enforcement. Martin et al. (2018) find that online drug sellers in Australia, a country with extensive border control, charge high premiums despite operating on a platform with international competition. In extension of this, the empirical paper presented in Chapter 7 finds that high prices correlate with steeper quantity discounts, adding further evidence to the inventory costs as a component of the risks & prices thesis. Similarly, deriving a typology of open and closed drug markets, May and Hough (2004) suggest that closed markets requiring third-party vetting are a response to high enforcement. As

such, decreased efficiency is tolerated for the purpose of safety. Similarly, Bright and Delaney (2013) explicitly invoke the notion of evolution, natural selection, to explain a drug organization network. The constraints of illegality also incur additional labor costs, for example, the need for runners or spotters who resupply and keep an eye out for law enforcement (Moeller, 2012). With some caveats, the transaction cost thesis, specifically as used within the risks & prices framework, still has explanatory power for organization, prices, and behavior, though it has not yielded significant benefits in terms of increasing drug prices and decreasing consumption.

The thesis that hierarchical market institutions emerge from frictions is explicitly functionalist (Williamson, 1981), which Dow (1987) summarizes as such: "governance structure X exists because efficiency requirements dictate X for transactions of type Y". That is, from the observation of a governance structure (e.g., a drug organization), it follows that it evolved to solve some frictions, if it is hierarchical, whereas none or few must exist, if a market is observed. Consequently, theses, such as an organization evolving as a response to uncertainty, become circular, and causality is hard to derive. In other words, it is tempting to see a hierarchical organization and conclude that frictions or evolutionary pressures caused this structure. Granovetter (2017) denotes these analyses "adaptive stories", and argue that "it is hazardous to assume that every economic institution can be explained as the solution to some problem" (p. 6). Moeller (2018a) highlights the empirical challenge to this functionalism, which would suggest that illicit organizations should be highly hierarchical, whereas empirical research frequently fails to find such forms (May & Hough, 2004; Natarajan, 2006). Rather, many illicit organizations are fluid networked structures, and markets are heterogeneous (e.g. Levitt & Venkatesh, 1998; Natarajan et al., 2015).

It is possible to modify the market/hierarchy distinction, by accepting a middle-range form, social networks (Moeller, 2018a). Drawing on the network approach in economic sociology (Granovetter, 2017), these may be seen as intermediary forms that emerge under structural constraints and the need for efficiency (Uzzi, 1997).

For example, the frictions introduced by law enforcement and opportunists may be reduced if one constrains exchange to stable partners (Moeller & Sandberg, 2015). Similarly, bonds of kinship and community may be an effective way of controlling opportunism (Schoenmakers et al., 2013). However, despite the inclusion of networks, the specter of functionalism remains. For example, in the study of illicit networks, namely those of drug organizations, the balance between efficiency/secretcy is central (Bichler et al., 2017; Bouchard & Ouellet, 2011). Effectively this mirrors the market/hierarchy distinction, but the problem of explanation remains: On observing an network, we may infer its structure as a function of law enforcement pressures.

Even though illicit exchange is typically embedded in social ties, firms, organizations, and improvised teams of entrepreneurs, scholars have remarked on a relatively free market structure (Adler, 1993; Reuter, 1984). In that sense, networks and the social embeddedness of exchange are not necessarily a large impediment to exchange, and scholars frequently observe markets to be quite efficient. However, the principal challenge to the transaction cost framework is its functionalism and inability to explain the diverse manifestations of institutional forms (Granovetter, 1992). These challenges do not negate key concepts, frictions and costs, but they necessitate a more nuanced and less functionalist understanding of institutions and organization (Granovetter, 1985; Moeller, 2018a).

### **2.3.2 Market institutions as social constructions**

Granovetter (1992) suggests it is more fruitful to consider institutions as emerging from distinct social processes, namely, networks and power struggles within them. In extension, Fligstein (2001) stresses the broader power struggles in society. For example, the struggle between labor and industry is used to explain labor market structures. As such rules and patterns emerge, for example, through networks, they tend to lock-in and become taken-for-granted (Fligstein, 1996; Granovetter, 1992). The classic example is presented by Granovetter (1992), who argues that the American electrical industry and its institutional form emerged

not out of market competition or optimization, but from networked struggles. Importantly, for economic sociologists, the object of interest is the institution, rather than the specific economic organization, the firm, as with transaction cost economics. Criminologists tend to examine both. Moeller, Svensson, and Munksgaard (2021), for example, examines the dynamics between the popularity of synthetic opiates and state regulation, whereas Sandberg (2008) and Adler (1993) discuss the culture of distinct markets (see also Dwyer & Moore, 2010a, 2010b). Conversely scholars such as Bright, Koskinen, and Malm (2019); Natarajan (2006) and Malm and Bichler (2011) focus on individual firms or networks of collaborators.

Although the economic sociological approach to markets and institutions was never developed with illicit markets at eye, it nevertheless has explanatory power, and two treatments of institutions may be proposed. The first is inherent to the notion that illegalized arenas of exchange are shaped by the formal institutional framework of law, epitomized in the risks & prices framework (Beckert & Dewey, 2017b). However, another emerges if one looks beyond the state and the licit spheres of the economy, towards institutions as stable patterns of norms and shared understandings (Fligstein, 1996). Here, institutions are simply "persistent patterns defining how some specified collection of social actions are and should be carried out", such as norms, rules, and procedures (Granovetter, 2017, p. 136). Interestingly, when scholars of illicit markets talk of institutions and exchange, the focus is generally restricted to the state and its constitutive role, whereas patterns of behavior, norms, and rules are typically referred to as norms or culture (e.g. Dwyer & Moore, 2010a, 2010b; Moeller & Sandberg, 2019; Sandberg, 2008). However, relatively stable market structures, such as bookmaking (Reuter, 1984, chapter 2) or the use of "dope stamps", branded heroin packets (Wendel & Curtis, 2000), may be considered social institutions as well, because they are stable and persistent patterns of exchange. If illicit markets are treated as such persistent patterns, it becomes possible to trace their roots and implications for exchange at a more general level: Illicit markets are heterogeneous and differentiated, because institutions do not emerge exclusively to reduce frictions.

Hirata and Grillo (2019) present a compelling analysis of drug markets in Rio de Janeiro and São Paulo, showing that two markets existing within the same formal context, large metropolises subject to the same laws, come to take radically distinct forms. Here, the levels of violence and modes of exchange are as different as a night and day. As such, it epitomizes the problem of explaining illicit markets and their organization: In Rio, armed guards, "soldados", accompany every street dealer (p. 125), but not in São Paulo. One market is at peace, while another is at war. Hirata and Grillo (2019) trace these unique manifestations to the social organization of the Rio drug market, which encourages territorial conflict, as opposed to São Paulo, wherein a more business-like structure pervades. One may suggest the difference is in whether they are organized hierarchically or take on more market-like qualities (Moeller, 2018a), but they exist within similar institutional environments (Zucker, 1987). Thus, in two similar cities, two distinct drug market institutions have evolved and remain highly stable, despite being subjected to the same formal regulation. Such approaches to local social orders, sensitive to norms and social fields, are also compatible with notions of "street capital" and Bourdieusian theory of fields (Bourgois, 2003; Sandberg, 2008; Shammass & Sandberg, 2016). Incidentally, this approach is utilized in economic sociology as well, to explain market institutions, their stability, and the institutional forms they come to take (Fligstein, 2001)<sup>3</sup>.

A fruitful conceptualization of illicit markets is to see them as social arenas of exchange (Beckert & Dewey, 2017b). Different arenas, institutionalized modes of exchange, take on distinct forms and have distinct norms and rules (Moeller & Sandberg, 2019; Steiner, 2017). Examples of such stable structures, beyond the work of Hirata and Grillo (2019), may be the Copenhagen cannabis street market of Christiania, in which sellers set up small boutiques from which cannabis is sold (Moeller, 2018b). Buyers approach the stand, stand in line, and purchase their

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<sup>3</sup>Fligstein's general thesis on markets as social fields is not immediately applicable for the purposes of this dissertation as it is being mainly concerned with firms, competition and macro-structure. I will therefore not expand it further, but only highlight that criminology and economic sociology frequently utilize similar frameworks.

desired product. Conversely, in Norwegian street markets studied by Sandberg (2008), sellers either "bum rush" prospective buyers, or establish norms for who gets which customer. Interestingly, such structures are highly stable and require significant disturbances to initiate change (Fligstein, 1996). In the case of Christiania, only a year-long police presence succeeded in displacing the drug market (Moeller & Hesse, 2013). Fligstein (1996) argues, that such institutional stability emerges because market actors seek to establish stable worlds of exchange; property rights, governance structures, rules of exchange, and to distinguish between what is proper and improper market behavior (Fligstein, 2001). When such stability is achieved, economic exchange is rendered possible (Beckert, 2009).

While developed with licit economies and formal firms in mind, seeing markets as social arenas of exchange, or institutionalized patterns, recognizes the heterogeneity of illicit markets by acknowledging that they are, first and foremost, socially constructed (Swedberg & Granovetter, 1992). In turn, Granovetter's (1992) network approach, in particular if one looks beyond social network analysis exclusively, and includes actors and their power struggles, is informative when it comes to seeing market institutions as shaped by historical and social processes. Thus, the economic sociological approach takes us from a conception of institutions and organizations as emerging out of necessity, or as optimal solutions, and instead acknowledges that they are distinct social institutions emerging out of the interplay between agency and structure. The heterogeneity of illicit markets across time, space, and institutional constraints is well-documented, but constitutes a significant problem of explanation if one seeks to develop a model of why markets and organizations take distinct forms (e.g. Adler, 1993; May & Hough, 2004; Natarajan et al., 2015; Reuter, 1984). Arguably, illicit markets exist under varying institutional constraints, and competition exists between actors, which must be assumed to induce some degree of natural selection. However, reasoning that "organization X takes form Y because it is optimal with regards to avoiding detection/minimizing risks", may be applied to any institutional or organizational form and is therefore not particularly informative. The pragmatic advantage to conceiving of illicit mar-

ket institutions as social constructions is that heterogeneity is expected, and that efficiency requirements are not of principal concern. The criminological reticence as to theories of illicit organizations and institutions, may be seen as the implicit acknowledgment that efficiency requirements are a problematic explanation faced with heterogeneity (Bichler et al., 2017). Further, the attention given to varieties of illicit market cultures may be seen as the recognition that market institutions are heterogeneous and socially constructed (e.g. Bourgois, 2003; Dwyer & Moore, 2010a; Sandberg, 2008, 2012; Scott et al., 2017). In this sense, the economic sociological approach to illicit markets and organizations and institutions does not diverge from the operational assumptions and findings of criminologists.

#### **2.4 The social embeddedness of exchange**

The notion of exchange and economic action as socially embedded is introduced by Granovetter (1985), though it originates with Polanyi (2001). Whereas Polanyi (2001) used the term to describe the premodern embeddedness of the economy in social relations, Granovetter (1985) drew attention to the social networks in which economic action is found (Beckert, 2007). Krippner and Alvarez (2007) and Krippner (2001) have criticized the notion of social embeddedness as overly focused on networks, at times so insistently that markets are left untheorized. Later works by Granovetter (2017) have moderated the network approach further, specifying that "I want to emphasize that [social networks] are not a privileged causal concept and by themselves have only modest explanatory value in most situations" (p. 5). Nevertheless, networks remain a key component of economic sociology, and provide an empirical bridge to criminology as well (Moeller, 2018a), though it does not fully capture the insights of the social embeddedness position (Beckert, 2003). In part, this is why scholars like Fligstein (2001); Krippner (2001) and Beckert (2007) have put less emphasis on networks. As has the latter Granovetter (2017) himself. The bridging aspect of the network approach, however, is quite apparent, as studies of illicit networks frequently make explicit reference to network strands of economic



sociology (e.g. Bichler et al., 2017; Bouchard & Ouellet, 2011; Bright et al., 2019).

Swedberg and Granovetter (1992) separate the notion of social embeddedness into two propositions, arguing that **a**) economic action is a form of social action, and **b**) that it is socially situated. Fundamentally, this means that economic action "cannot, in principle, be separated from the quest for approval, status, sociability and power" (p. 7), and further, that economic action is situated socially in, for example, networks of relationships. An example of the former is Bourgois (2003), who observe drug sellers seeking status not afforded them by contemporary American society, while the latter is illustrated by Jacques et al. (2014) who find that drug market opportunism tends to target those who lack social ties (Jacques et al., 2014). Quite literally, a socially disembedded actor is defrauded, whereas actors who purchase drugs through friends experience few problems (Bright & Sutherland, 2017; Jacques & Wright, 2015; Scott et al., 2017). However, this does not undermine Granovetter's (1985) thesis that economic action is socially embedded, because a lack of social ties is specifically argued to increase the probability of opportunism. Thus, the notion of exchange as socially embedded in networks and the weight given to notions of status and reputation in illicit markets, are included in the embeddedness approach (Moeller, 2018a).

The notion of social embeddedness constitutes a departure from more classical economic approaches, which conceive of actors as socially atomized, what Granovetter (1985) argues is an undersocialized conception of actors (see also Simpson & Willer, 2015; Wrong, 1961). The fertility of the social embeddedness approach may be shown by turning to a concept usually reserved for economists, prices (Beckert, 2011; Moeller, 2018a). For example, Dwyer and Moore (2010a) show how drug dealers charge customers different prices based on social relations in an Australian street market, whereas Jacques and Wright (2015) show how prices are embedded in ties of friendship in a suburban drug market. Similarly, Moeller and Sandberg (2019) shows that pricing in the middle layers of Norwegian drug distribution is embedded in narratives of friendship, business, and culture (see also Belackova & Vaccaro, 2013; Bright & Sutherland, 2017). Thus, prices, generally assumed to

be a function of risk, supply and demand, vary depending on social relations because exchange is embedded and cannot be separated from social content such as friendship or group membership (Moeller, 2018a).

Illicit markets, at times, take such forms that they barely resemble markets. Moeller (2018a) appropriates the notion of "marketness" to distinguish between markets on the axis of the relative importance between price and social concerns (e.g. status, friendship). This allows a differentiation between illicit markets of different forms. Social supply, the exchange of drugs within networks of friendship in which profit is either a secondary or irrelevant concern to the seller (Bright & Sutherland, 2017), takes such a low marketness form that some scholars have even suggested they be considered communities rather than markets (Scott et al., 2017). At the other end of this scale, marketness may be higher in street markets, wherein actors are more or less anonymous and less encumbered by social ties (Moeller, 2018a). Here, sellers can compete, and incidentally, in such markets, violence, fraud, and predation are more prevalent (Jacques et al., 2014; Levitt & Venkatesh, 1998). Discussing the role of rationality in drug markets, Childs, Coomber, and Bull (2020) suggest that different arenas of exchange and their social organization encourage more or less rational action. As such, the degree of embeddedness can be said to moderate behavior with respect to, for example, opportunism, violence, the pursuit of status, and price.

Finally, an extension to the notion of embeddedness, merging it with Fligstein's (1996; 2001) institutional approach, is the notion of coordination problems. Beckert (2009) poses these as concrete empirical questions for the analysis of how local social orders come to be (i.e., markets as fields or social institutions). Departing from the assumption that market actors seek stable worlds of exchange (Fligstein, 2001), the challenge is therefore to deduce how these problems are solved. This notion of stable worlds constitutes an important departure from economic analysis, because while Fligstein (2001) acknowledges competition is constitutive of markets, firms do not benefit from competing in prices. These coordination problems concern valuation, competition, and cooperation. In illicit markets, these predominantly

concern problems already introduced in the preceding sections: How value can be estimated absent regulation under bounded rationality (valuation, Akerlof, 1970), and how partners can be ensured to cooperate absent contracts (opportunism). The problem of competition, however, is a significant extension and may be approached as the means by which sellers and firms avoid price competition. Such resolutions may be violence and claiming territory (Levitt & Venkatesh, 1998), or institutional patterns of how exchange is conducted, for example, how customers are approached in drug markets (Hirata & Grillo, 2019; Moeller, 2012; Sandberg, 2008). This is a particularly interesting assumption, that actors seek to establish stable worlds of exchange (Fligstein, 2001), and seems contradictory to economic assumptions (Dwyer & Moore, 2010a). However, it is quite reasonable. Two drug dealers competing on price will reach a point where neither makes a profit, and a solution might be for both to embed exchanges in networks, or to differentiate themselves by selling different products (Beckert, 2009; Beckert & Wehinger, 2013). One may say that embeddedness moderates the resolution of coordination problems, so that they are not always rooted in economizing and strict rationality (Swedberg & Granovetter, 1992). Beckert's (2009) notion of coordination problems is utile, but it may be argued to retain some of the adaptive storytelling, and infer function from appearance: X solves the coordination problem of Y. For example, Tzanetakis (2018b) suggests that a classification system putting different drugs in different categories in an online drug market solves the problem of valuation by allowing easy migration to another platform with similar categories (p. 67). While efficiency requirements are removed from the equation, the notion that coordination problems must be resolved for exchange to actualize makes it tempting to infer function from appearance.

The economic sociological approach does not necessitate abandoning a presumption or theory of rational, economic, or purposive action (Moeller & Sandberg, 2019). However, such action is moderated by social constraints, and noneconomic goals may be pursued in addition to economic ones (Granovetter, 2017, p. 20). Such a model of social action and motivation, is compatible with the significance

of noneconomic motives like status and reputation for some actors that is observed in illicit markets (Bourgois, 2003; Denton & O'Malley, 1999; Sandberg, 2008), but also the fact that these are profit-driven crimes (Naylor, 2003). This is why the notion of marketness is practical, because it acknowledges that the ratio of economic and noneconomic ends vary across markets thus bridging the division between the economic and the social understanding of illicit markets in criminology (Moeller, 2018a). In this sense, it a concept that allows both the noncommercial social supply of drugs among friends, as well as street corner deals between strangers, to be illicit exchange.

The embeddedness perspective draws attention to how social ties shape and form markets, and in turn, how exchange takes place within or outside networks. To conceive of illicit exchange as socially situated, and economic action as social action, is compatible with the differing manifestations of illicit exchange. However, it does not constrain action to a function of risk and rational utility maximization, and neither does it assume that organizational modes or institutions evolve for the purpose of efficiency. In other words, with slight modifications to how we conceive of economic action in illicit markets, the social embeddedness approach is more easily reconciled with criminological observations of exchange behavior in illicit markets than the transaction cost perspective. As appears in the above examples, such conceptions are already latent, or explicitly acknowledged (e.g. Dwyer & Moore, 2010a), but the economic sociological approach renders them explicit (Moeller, 2018a).

## **2.5 Exchange as a crime**

In the preceding sections I have situated illicit markets in relation to the state, and discussed their organization. I have drawn on a fragmented criminology of illicit markets that has discussed their relation to the state, their organization and institutional constraints, and risks and prices. I have sought to integrate these within an economic sociological framework. My argument has been that

the principal differences between the two approaches is their relative emphasis on different objects of interest, namely secondary crimes and the state, but that their assumptions are shared: The state is not a passive entity, but constitutive of illicit markets; illicit markets are heterogeneous and hard to capture based on rigid assumptions of economizing on transaction costs; and exchange is socially embedded. Brought together, these components allow a different perspective on exchange as a crime – the primary crime of illicit markets.

Naylor (2003) suggests differentiating profit-driven crimes as predatory, market-based, or commercial. Here, the defining quality is whether they redistribute existing wealth, produce illegal income, or redistribute legally earned income (Naylor, 2003, p. 90). An example of the first is stealing from another criminal, and an example of the third is embezzlement. Examples from the drug economy are, for example, ripoffs, and theft (Bouchard et al., 2020; Jacques et al., 2014). The primary crimes of illicit markets are the production, distribution, and sale of goods and services outside regulation, taxation, and prohibition, and these fall within the scope of market-based offenses. They are therefore qualitatively different crimes, compared to the use of force and fraud, predatory and commercial crimes, because at their base, if one disregards the violation of law and norms, they are prosocial activities; the voluntary exchange of goods and services. This is the reasoning that underlies more politically invested analyses and understandings in which illicit markets are simply manifestations of the human propensity towards peaceful cooperation that have been illegalized by the state (Brooks, 2020; Konkin III, 1995).

Such a neat distinction may be fitting for the production, distribution, or sale of illegal cannabis, for example, since force and fraud are not necessary for either step. However, the crimes associated with illicit markets are manifold: Violence, fraud, exploitation, and so forth. Naylor (2003) denote these as "secondary crimes" (p. 91), which may serve purposes such as conflict resolution or competition (Dickinson, 2017). Black (1983) suggests that "for certain theoretical purposes we might usefully ignore the fact that crime is criminal at all", which is a utile tool for further distinguishing market-driven crimes (Black, 1983, p. 42). Within social control

theory secondary crimes can be argued to constitute informal social control in the absence of law or as "self-help" (Black, 1976). For example, the use of violence or the threat thereof resolves the conflict that a debtor owes a drug dealer (Moeller & Sandberg, 2017). In this sense, some secondary crimes are functional alternatives to law.

Thus, a distinction may be made between exchange, which is illegitimate and illegal to varying extents, and other crimes. This is because they, as ideal types, do not necessitate force or fraud. A second distinction may then be made, between non-market-based crimes, and secondary crimes that function as self-help or conflict resolution. However brutal the latter is, functionally it replaces formal law (Black, 1976). In that sense, we may consider it "productive" or "supportive" of some market-based crimes. Yet, offenses that are exclusively market-based may be argued to retain exploitative and predatory elements, such as the sale of sexual services, and it is not simple to separate the two (Weitzer, 2005). Some of these offenses may also conform to notion of self-help or conflict management outside the law (Black, 1983). The distinction between market-based crimes, crimes of social control, and other crimes (e.g. predation, fraud) is therefore not always as clear-cut (Naylor, 2003). However, the qualitative difference remains that force and fraud are not necessary components of market-based crimes that produce income by evading taxation, regulation, or prohibition. These tend to, however, be associated with secondary crimes of conflict management or self-help – informal social control – because law is unavailable.

Whether voluntary exchanges of drugs, sexual services, or other goods and services can ever be separated from force and fraud, is another discussion (Naylor, 2003). Prostitution is one example of a market crime which is difficult to separate from force and fraud (Agustin, 2003), and it is likewise hard to separate the market crimes associated with illicit drugs, for example cocaine, with the violence and exploitation involved in its production and some of the preceding market crimes (Gutiérrez D. & Thomson, 2020; Reuter, 2009). However, the distinction, even if ideal typical, is informative for understanding illicit markets. For example, studies

of threats and debts in drug markets show how market-based crimes are supported by secondary social control crimes (Adler, 1993; Dickinson, 2017; Moeller & Sandberg, 2015). Similarly, Reuter (1984) argues that the Mafia supports illicit markets by mediating between parties. Even more extreme, in territories occupied by the insurgent guerrilla FARC-EP conflict between coca peasants and narco-traffickers was managed by a group organized after rigid political lines (Gutiérrez D. & Thomson, 2020). The pragmatic point is this: The absence of law in illicit markets is crimiogenic (Naylor, 2003), and this motivates some forms of self-help and conflict management crimes (Black, 1983). These are functional replacements to formal social control. Whether these are distributed, exercised, or conducted in an ideal or legitimate manner, in ethical and political terms, is secondary. Illicit markets are often observed to function as free market capitalist economies (Adler, 1993; Reuter, 1984), which may well be argued to be inherently exploitative (Spitzer, 1975). But as Gutiérrez D. and Thomson (2020) show, they may also be organized along rigid political lines (in this case, according to Marxist-Leninist ideology with Maoist tendencies). Similarly, structures may also value profit less taking on a more communitarian ethos (Scott et al., 2017). In each of these cases, when force or fraud are absent or minimal, all parties can benefit and value can be generated through production, arbitrage, distribution, and sale. Force and fraud, deviance, may then be regulated and deterred through informal social control (Black, 1983). Fairness in distribution, however, is a matter of social structure (Fligstein, 2001).

This exercise implies an answer to why there is no criminological theory of illicit markets, and the literature instead occupies itself with force, fraud, and secondary crimes associated with markets (Moeller, 2018a; Naylor, 2003). Although market-based crimes violate the law and social norms, when they are separated from force and fraud they are productive, profitable, and oddly prosocial and norm-abiding in their own way. Secondary crimes; predation, force, fraud, and brutal crimes of social control, however, can appear brutal and savage (Black, 1983) thus invoking the delegitimization of their associated market-based crimes (Beckert & Dewey, 2017a).

## 2.6 Notes for an economic criminological approach illicit markets

Within this chapter I have defined illicit markets in relation to the state, discussed their organization, and defined illicit exchange as a crime. This is a continuation of the argument developed by Moeller (2018a) and Beckert and Wehinger (2013), but with two distinct priorities. First, I have de-emphasized the transaction cost framework, arguing that it is vulnerable to functionalist reasoning, "adaptive stories", in which function is inferred from structure. Second, I have sought not to cede territory to economic sociologists, but to argue that the basic assumptions of the emerging economic sociology of illicit markets are latent in criminological research. When it comes to key tenets, that exchange is socially embedded and that the state is constitutive of illicit markets, these need only be rendered explicit. The economic sociological tenets that started the chapter may therefore be revisited, specified further, and summarized to elucidate the theoretical framework used to understand illicit markets in this dissertation.

### **1. Illicit markets exist in relation to the state. The state is constitutive of their illegality, and a crucial actor in their delegitimization.**

Markets for goods and services that are illicit may be situated along continua of legitimacy and legality (Beckert & Dewey, 2017b), a macro-level that mirrors the crime/deviance distinction (Felson, 2006; Tittle, 2004). The productive capacity of the state enters the equation through, in particular, law. Some or all acts associated with a market can be illegalized to varying degrees (Naylor, 2003). Through illegalization illicit markets are brought into being, and the implementation of law shapes them more fundamentally. This is the assumption behind the risks & prices framework which is foundational to drug market criminology (Moeller, 2018a; Reuter & Kleiman, 1986). The assumption is the inverse of the traditional economic sociological one (Beckert & Dewey, 2017b; Fligstein, 2001), and may be conceived of as a formal institutional constraint (Moeller & Sandberg, 2019).



**2. Illicit market institutions, patterns of norms and behavior, are heterogeneous. They do not arise exclusively from processes of competition, evolutionary pressure, or economizing, but are social constructions.**

A significant problem that appears in the application of the transaction cost framework that underlies economic approaches to illicit markets is its functionalism (Moeller, 2018a). Since a governance structure emerges from economizing on transaction costs, and these are predominantly caused by law enforcement, then hierarchical organizations should be the default (Reuter, 1984). Networks may be argued to constitute a middle-ground organizational form (Moeller, 2018a), but this does not solve the underlying problem which is the functionalism or "adaptive stories" inherent to the approach (Dow, 1987; Granovetter, 2017). Criminological research observes different organizational modes, predominantly in network form, and markets are heterogeneous: Drugs are exchanged between friends, guns can be sold at a party, organs procured through family, and narco-traffickers can be taxed by insurgents. It is possible to acknowledge that all criminal acts exist under institutional constraint, without reasoning that all organization can be explained thereby. Rather, a more fruitful perspective is to acknowledge the heterogeneity of market institutions and organizations without resorting to functionalism, by acknowledging they are social constructions. A pragmatic way of doing so, is to acknowledge that organizations can differ in efficiency, secrecy, and transaction costs, while recognizing that structure is not a function of optimizing over these. This is a notion that I will return to in the forthcoming chapter.

**3. Exchange under conditions of illegality is both social and economic action, and it is socially embedded.**

The notion of economic exchange as socially embedded and inherently social action is perhaps the most obvious commonality between criminological scholarship and economic sociological orthodoxy (Swedberg & Granovetter, 1992). That illicit

exchange tends to be embedded in social relations and social networks is a basic observation (Moeller, 2018a), but it is crucial because notions of bounded rationality and informal social control are contingent on this embeddedness (Jacques & Allen, 2014; Jacques et al., 2014; Moeller et al., 2016). Reputation, for example, only derives its sanctioning power through dissemination in a social network (Denton & O'Malley, 1999; Glückler & Armbrüster, 2003). Exchanges may, however, also take outside networked structures, such as the street markets discussed by (Hirata & Grillo, 2019), which may be better conceived of as social arenas of exchange (Beckert & Dewey, 2017b).

**4.1 Exchange, and related market-crimes (e.g. production, distribution, transport), are distinct crimes because they do not necessitate force and fraud against participants.**

**4.2 The absence of formal social control in illicit markets leads to an increase in informal social control. Secondary crimes of social control and self-help may be seen as functional replacements to formal law.**

Finally, drawing on Naylor (2003) I have suggested that exchange and related market-based crimes constitute a distinct class of crimes. This is a further qualification of the primary crimes of illicit markets, and introduces a necessary separation that will become utile later. The production of wealth, if neither force nor fraud is utilized, is a unique type of crime. If a victim can be identified, it is the state, because market-based crimes break prohibition, evade taxation, or ignore regulation. For the actors involved, these crimes are productive because they generate value through products, services, and cash (Gutiérrez D. & Thomson, 2020; Reuter, 1984). Even when these are noncommercial, exchange can produce friendship relations and status (Belackova & Vaccaro, 2013; Bourgois, 2003; Sandberg, 2008). Drawing on social control theory, the secondary crimes associated with market-based crimes may be seen as attempts to regulate the use of force and fraud by market actors in the absence of law (Black, 1976, 1983). Connecting the three

levels of analysis, these crimes appear because deviance needs to be regulated in the absence of a state (Black, 1976). Their regulation is heterogeneous across time and space and contingent on the arenas of exchange in which it is found.

The modified assumptions will support the remainder of this work. My contention remains that these are not novel insights, but general assumptions, more or less explicit, which the scholarship on illicit markets operates under. However, they are crucial for the forthcoming analyses, which will echo them.

## CHAPTER 3

### ILLICIT ONLINE MARKETS

At their simplest, illicit online markets are websites and applications, and are, in the most practical sense, social constructions. The ability to, for example, exercise social control and deter opportunism is fundamentally a question about code that organizes economic activity (Langley & Leyshon, 2017). In his retelling of the Sologne strawberry market, Callon (1998b) details how a premodern exchange institution came to be radically redesigned, as a Parisian economist implemented a market modeled on textbook neoclassical economics; perfect information, price comparison, and price competition (see also Garcia, 1986). Through "the rejection of networks of relations, and [...construction of] an arena in which each entity was disconnected from the others", a new mode of economic exchange was rendered possible (Callon, 1998b, p. 22). Through this process of "framing" economic activity, certain exchange modalities become possible, in this case the atomized, anonymous, ideal economic agent with perfect information who can sell and buy strawberries unencumbered by social embeddedness (Polanyi, 2001). Conversely, drug street markets, social supply, and the trade in the levels above, them allow different modalities of exchange (Bourgois, 2003; Childs, Coomber, & Bull, 2020; Jacques & Wright, 2015; Moeller & Sandberg, 2015).

The thesis of this chapter is that the social construction of illicit online markets shapes and constrains exchange in unique ways: Markets may allow exchange and discourse to co-exist or separate them, they may increase or decrease access to exchange partners, they can introduce verification mechanisms, they can formalize reputation, and they can produce power relations (Garcia, 1986). As these distinctions become apparent, the intricacies of encryption technology, anonymization tools, or decentralized virtual currencies, come to matter less than the social organization of illicit online markets (Bakken et al., 2018; Ladegaard, 2020; Tzanetakis, 2018b). Rather, market-like qualities and social control become distinguishing

characteristics. The aim of this chapter is to illuminate the social and economic organization of illegalized exchange online. It thus follows from the discussion of economic organization in the preceding chapter, and by extension, the embeddedness of economic action.

I begin the chapter by developing an ad hoc typology of illicit online markets. Hereafter, I treat two topics, the open/closed distinction of illicit online markets, and the governance of them. Building on these sections, I derive an ideal typical differentiation of illicit online markets across the axes of marketness and governance. I conclude the chapter by providing a brief introduction to cryptomarkets, the empirical domain of the dissertation, and situating it within the preceding discussion.

### **3.1 A typology of illicit online markets**

There is no classificatory scheme for illicit online markets, but they may broadly be separated into ideal typical classifications. The point of ideal typical separation is not to discuss the "uniqueness" of discrete types, but to "synthesize meaningful, characteristic aspects of individual phenomena in order to explain the occurrence of social events" (p. 121 Hekman, 1983). A similar approach, for example, applied by Beckert and Dewey (2017b) and Moeller (2018a), is to distinguish markets across axes of legitimacy, legality, and marketness, a "fuzzy" ideal typical classification (Kvist, 2007). Rarely will an empirical manifestation take one extreme, but analytical differentiation is possible by focusing on broad characteristics above uniqueness.

In Table 3.I five different market types highlighted. This separation of ideal types draws on typologies proposed by Du et al. (2018); Dupont, Côté, Boutin, and Fernandez (2017) and Wehinger (2011), with one addition, the group type. These ideal types represent institutionalized modes of exchange and arenas of exchange (Tzanetakis, 2018b). Organizations that utilize them (e.g., a hacker forum like Darkode) may be seen as concrete organizations that manifest these institu-

	Channel	Shop	Group	Forum	Platform
Example	IRC Channels	NPS shops	<i>Facebook</i>	Bulletin boards	Cryptomarkets
	<i>Wickr</i>	Autoshops		<i>Darkode</i>	<i>Silk Road</i>
	<i>Telegram</i>				<i>Hydra</i>

**Table 3.I** – Examples of illicit online markets. Specific platforms in cursive.

tional qualities (DiMaggio & Powell, 1983). Being ideal types, these reflect that, for example, platforms are predominantly found on the dark web, and escrow is generally not observed outside forums and platforms. Thus, a website selling stolen credit card data, for example, is an organizational iteration of the shop, and it is likely to not offer escrow or a reputation system.

Predominantly, the body of research on illicit online markets concerns itself with drugs, stolen data, and hacking (Barratt & Aldridge, 2016; Holt & Bossler, 2014). Niche markets, such as the distribution of warez (Décary-Hétu, Morselli, & Leman-Langlois, 2012), or the barter-like economy of trading non-consensual sexual images like "hockey cards" (Dodge, 2020), are therefore not captured by the typologies of Du et al. (2018); Dupont et al. (2017) and Wehinger (2011), nor the extensions I make. Some types are also better documented than others, and as the discussion progresses, the forum and platform types take precedence, simply because these are the types for which there is a consistent, up-to-date, and extensive body of literature.

The following sections will revolve around these different forms and their characteristics, and I will emphasize their implications for exchange. Though their sophistication varies, with later additions presenting themselves as superior (e.g. Przepiorka et al., 2017), it is important to note that each type persists today. As such, it is more fitting to conceive of them as institutional forms, prototypical markets, rather than evolutionary stages or functional responses to optimization problems (Granovetter, 1992, 2017).

### 3.2 Prototypical markets and their organization

The channel is one of the earliest observed forms of illicit online markets. It may be either one-way communication or allow multiple actors to participate. Examples of the latter are IRC, Internet Relay Chat, channels in which sellers offer their goods to prospective buyers (Herley & Florêncio, 2010). These are predominantly used within hacker communities and for the sale of stolen data (Benjamin, Li, Holt, & Chen, 2015; Benjamin, Zhang, Nunamaker, & Chen, 2016; Décary-Hétu & Dupont, 2013; Du et al., 2018). IRC is a relatively old protocol, but newer iterations of the format are used in social media drug dealing. Here, sellers operate channels using encrypted chat applications like Telegram or Wickr, and publicize pictures and prices of their current inventory to prospective buyers (Demant, Bakken, Oksanen, & Gunnlaugsson, 2019). Buyers may then order the product and have it delivered (Moyle, Childs, Coomber, & Barratt, 2019). These can be seen as emerging out of the more traditional "ring and bring"-services which would "spam" known buyers with text messages of similar content (Søgaard, Kolind, Haller, & Hunt, 2019). Within these groups, organization is relatively simple: One individual or group controls the channel while users participate. In IRC channels, administrators may allow multiple sellers to offer goods, while drug sellers typically operate their own channel (Bakken & Demant, 2019; Moyle et al., 2019; Yip, Webber, & Shadbolt, 2013).

The second type is the shop. The shop is built like a traditional internet store, meaning an owner operates a storefront from which customers buy product. Prominent cases are the sale of "booters" (Santanna et al., 2015), minor botnets which can temporarily take a website offline through Distributed-Denial-of-Service attacks (DDoS). Historically, the sale of NPS, new psychoactive substances, has also to a large extent taken place in such shops (Orsolini, Papanti, Corkery, & Schifano, 2017; Surmont, Daniélsson, Hughes, & Sedefov, 2018). Similarly, "rogue" online pharmacies have for years enabled the purchase of medicine like Adderall without prescriptions (Littlejohn, Baldacchino, Deluca, & Schifano, 2005; Penley, Chen,

Eckel, & Ozawa, 2020). Stolen credit cards are also frequently purchased from so-called autoshops, which allow buyers to select product from a larger inventory (Benjamin et al., 2015; Wehinger, 2011). A relatively new manifestation is vendor shops, which are small websites selling traditional illicit drugs rather than NPS (Flamand & Décary-Hétu, 2019; Kruithof et al., 2016).

The third type, the group, is a relatively new addition emerging in some recent studies. The prototypical group is an open, closed, or invite-only group on a social network, namely, Facebook. Groups facilitating contact between drug sellers and buyers, observed by Stevens (2016), were predominantly closed or required an invitation. Conversely, Xu, Cai, and Mackey (2020) documents a flourishing trade in illicit wildlife on Facebook through open groups. The common characteristic is that in the group multiple sellers are allowed to advertise, though it is uncertain whether administrators require fees or restrict sellers. Typically, the group is used to identify exchange partners, after which communication is moved to a channel or one-to-one communication (Demant et al., 2019).

The fourth type is the forum. Forums have predominantly been used by hackers, both for the sale of services, such as hacking or DDoS-attacks, and for goods like stolen data (Yip, Webber, & Shadbolt, 2013). Forums in which drugs are sold exist (Bancroft et al., 2020), but drug market forums typically function as places of conversation rather exchange (e.g. Bilgrei, 2016; Munksgaard & Demant, 2016). In forums, communication is asynchronous with sellers and buyers being able to peruse threads themselves, as opposed to the channel format. Here, products are advertised by multiple sellers, which buyers can review and discuss within the forum. Importantly, in forums, exchange and nonexchange behavior takes place within the same space, contrary to the channel and the shop. Consequently, some scholars have likened them to "tough bars", designating them as offender convergence settings (Leukfeldt, Kleemans, & Stol, 2016; Soudijn & Zegers, 2012).

The fifth type is the platform. The platform mimics the design of platform economies, offering sellers a storefront (similar to the shop), and a number of services (Langley & Leyshon, 2017; Martin et al., 2019). The platform is predom-



inantly used for the trade in illicit drugs, though stolen data and other services associated with hacking have also made their entry. These are also referred to as anonymous online markets, darknet markets, or cryptomarkets (Martin, 2014a; Soska & Christin, 2015). Differentiating itself from the forum, the platform brings sellers and buyers together in the same manner, though the social content of exchange is reduced (Soudijn & Zegers, 2012). The platform is for exchange, while social interaction is confined to associated forums or private messages.

These five ideal types are useful for distinguishing between the variety of illicit markets that exist online. As becomes apparent, several of them mimic changes in licit online commerce, namely, the shop and the platform (Langley & Leyshon, 2017), whereas others seem to follow trends in the social internet, from the early days of IRC and Bulletin Boards (Yip, Webber, & Shadbolt, 2013), to Facebook and encrypted messengers (channel, group, forum). Finally, the platform appears the most complex form, mimicking the online platforms of the licit economy (Rysman, 2009). Furthermore, systematic tendencies are also seen, such as NPS being sold in shops (Brunt et al., 2017; Orsolini, Francesconi, Papanti, Giorgetti, & Schifano, 2015; Surmont et al., 2018). Following the discussion of organizational modes in Chapter 2, explaining this differentiation would be difficult with reference to transaction costs and frictions. However, the patterns of different industries utilizing different modes of economic organization, such as NPS sellers using shops and hackers using forums, attest to both a consistency and homogeneity in institutional forms within the same environment (DiMaggio & Powell, 1983), as is suggested by the economic sociological perspective (Fligstein, 2001; Granovetter, 1992). Traversing these ideal typical market forms it also becomes apparent that some platforms epitomize the notion of social embeddedness, literally embedding exchange within forums or social media websites (Dupont et al., 2016; Lusthaus, 2012), whereas modes of organization like the platform and shops exclude social content.

### 3.2.1 Open or closed, deep, dark or clear?

Illicit online markets may be differentiated by their modes of access and the domains in which they operate. There is an already existing literature on the differentiation of illicit markets and their organization, which provides a starting point for such a discussion. Within the drug market literature, scholars will differentiate between open and closed markets (May & Hough, 2004), a distinction extended in the study of illicit online markets (Aldridge & Décary-Hétu, 2016). This differentiation may be seen as arising out of structural necessities and pressures, a perspective rooted in transaction cost economics (Herley & Florêncio, 2010; Williamson, 1981), as resolutions to coordination problems (Bakken et al., 2018; Beckert & Wehinger, 2013), or as distinct institutional characteristics (Granovetter, 1992; Tzanetakis, 2018b). Implicit in each, as discussed in Chapter 2, such social structures shape and constrain exchange relations.

Distinguishing illicit online market types by whether they are closed or open is a first hint towards their social and economic organization. Whether a particular site is open or closed, however, is a matter of demarcation. I define open as **access being unrestricted by others**, and closed as **necessitating either invitation or approval**, but note that networks and skills can also constitute an impediment for access to either (Aldridge & Décary-Hétu, 2016; Tzanetakis, 2018b). Importantly, traditionally demarcating qualities, such as closed markets being only available to known people, (May & Hough, 2004), are tricky to utilize online where everyone operates under a pseudonym or anonymity (Aldridge & Décary-Hétu, 2016; Bancroft & Scott Reid, 2017).

Channels are hypothesized to exist in both open and closed forms, with the latter only being open to a select few (Herley & Florêncio, 2010). The evolved ring-and-bring services on encrypted applications are closed, and access is contingent on social networks wherein information is exchanged between peers (Søgaard et al., 2019). Shops, on the other hand, are owner-to-buyer forms, and typically accessible without anything more than awareness of their existence (e.g., a Google search,

rumor, a URL, Benjamin et al., 2015; Flamand & Décary-Hétu, 2019). The group is accessible to anyone with knowledge of it, or by searching for it, a relatively low bar seeing as they may be found on social networking sites (Demant et al., 2019; Xu et al., 2020). While they may be closed in the sense that users have to submit a request to join the group, this is likely only a formality protecting against obvious law enforcement and giving users some privacy (Stevens, 2016). Forums, on the other hand, exist in both open and closed forms. The elite congregates in the latter, while those who either seek wide marketing of their services, or have a low skillset, are found in the former (Décary-Hétu & Dupont, 2013; Dupont et al., 2017). Finally, platforms operate in what Ladegaard (2020) describe as "open secrecy", a paradoxical combination of transparency, identity verification, and illicit exchange rendered possible by the existence of cryptographically verifiable identities (see also Tzanetakis, Kamphausen, Werse, & von Laufenberg, 2016). While some scholars highlight restrictions to access, namely, their existence exclusively on the dark web and a combination of technical skills and social competencies (Ladegaard, 2019b; Tzanetakis, 2018b), locating them and registering an account is a simple task (Aldridge & Décary-Hétu, 2016).

Drawing on Williamson (1981), and the criminological moderation (Moeller, 2018a), these organizational patterns mimic the distinction between markets, networks, and hierarchies discussed in Section 2.3.1. Some institutional forms are closed, some are networked, and some are open, qualities which structure exchange, namely, by restricting or opening the pool of potential buyers and sellers (Muniesa, Millo, & Callon, 2007).

At this point, it becomes necessary to distinguish between the clear web, the dark web, and darknet. There is a continuous confusion of terms within the literature in which terms are used interchangeably, impose value judgments (e.g. Weimann, 2016), or in which scholars use different terms for the same empirical phenomenon. For example, scholars use terms such as darknet or deep web to describe the same type of website (e.g. Martin, 2014b; Norgard, Walbert, Harold, & Hardy, 2018; Rhumorbarbe et al., 2018). Evidently, a rigid distinction is necessary.

The use of these terms can be traced back to Bergman (2001), who suggested that information on the web was either located on the clear web or the deep web. The former consisted of pages that could be located using search engines, while the latter was either unindexed or accessible only through separate networks (e.g., corporate intranet, email accounts). Throughout the following years, new terms were added; dark web, clearnet, and darknet. Gehl (2018, p. 5) builds on Bergman's original definition, and suggests a clear coherent schema for these: "Web" is websites built on HTML, PHP MySQL and so forth, the basic building blocks of web sites. "Net" is separate networks such as IRC channels, encrypted instant messaging apps, and likes. Finally, the clear/dark distinction is whether specialized software, namely, tools for anonymization and encryption, is required. "Deep" remains as defined by Bergman (2001), unindexed content. The advantage of this clear distinction is that it is stripped of overtly political discourse and agendas (e.g. Weimann, 2016), and that it is empirically applicable, allowing us to attach either of them to the typology previously presented. Platforms, for example, are almost exclusively found on the dark web, whereas groups are found on the clear web (e.g., on Facebook). Similarly, shops are known to use both. Since channels predominantly use instant messaging protocols, these use the darknet.

Overwhelmingly, websites that utilize the dark web are found within the Tor network, with a few using alternative networks like i2p or Freenet (Gehl, 2018). Tor anonymizes and encrypts internet traffic using a mixnet-like structure, in which internet traffic passes through multiple computers, thus disconnecting its origin from destination (Chaum, 1981; Dingedine, Syverson, & Mathewson, 2004). This allows a user to visit a website in anonymity from their ISP, the target website, or a third party (Jardine, 2016). Similarly, website owners may hide the location of their website so that it cannot be located by law enforcement. There is no metric of the absolute number of websites using the Tor network, and their ephemeral nature means that they frequently disappear. Some empirical studies have sought to estimate the size and content of the Tor network, and Sanchez-Rola, Balzarotti, and Santos (2017) locate 7.257 websites, while Spitters, Verbruggen, and Staalduinen

(2014) find 5.725, and Moore and Rid (2016) identify 5.205. These metrics are all below those provided by the Tor Project itself, which today numbers above 150.000 websites (Tor Project, 2020). The discrepancy is likely caused by the fact that many hidden services either cannot be found by the techniques employed in these studies, or that they may host no content. Both Spitters et al. (2014) and Moore and Rid (2016) apply automatic text processing and conclude that the majority of the content hosted using the Tor network is illicit, encompassing predominantly child sexual exploitation material, hacking, and illicit drugs.

It is important to recognize that the dark web or net is not a prerequisite of illicit online exchange. The cybercrime literature has extensively documented shops and forums with illegal content and exchange on the clear web (e.g. Abbasi, Li, Benjamin, Hu, & Chen, 2014; Décarv-Hétu & Dupont, 2013; Hutchings & Pastrana, 2019). Anonymity, specifically the anonymity of connecting users and website operators, is a distinction that is useful for a typology, but it is not a functional necessity. The platform Hydra Market, a Russian-language drug market, operates on both the clear and dark web (ElBahrawy et al., 2019)<sup>1</sup>. Similarly, there is a long history of using so-called "bulletproof hosting", hosting one's website on servers in countries with little regard for legal requests (Europol, 2016; Lusthaus, 2013; van der Wagen & Pieters, 2015). If a distinction should be made, it is that websites on the dark web cannot be directly located by law enforcement, and communication to and from them is anonymous and encrypted by default (Moore & Rid, 2016).

### 3.2.2 Roles, organization and governance

Within each market type, there are different roles available. There is a buyer role in each, but roles like administrator, moderator, seller, and owner are differ within these markets (Yip, Shadbolt, & Webber, 2013). At the simplest organizational

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<sup>1</sup>There are relatively few scholarly publications on Hydra, which is likely attributable to it being a Russian-language website. I am grateful to Patrick Shortis, doctoral candidate at the University of Manchester, for information on Hydra.

level, shops have two actors, the owner/seller of the website and the buyer. This pattern is also seen in channels at times, though they tend towards being open to multiple sellers (Herley & Florêncio, 2010). At this point, groups and channels diverge, being further under the control of an administrator when there are multiple sellers. Forums and platforms take it a step further, usually hiring moderators who keep forums civil, resolve disputes, and provide customer service (Morselli et al., 2017). As their social organization grows more complex, power and governance are therefore introduced, and these arenas of exchange change character.

An important distinction is whether a market type caters to one or multiple sellers, and whether a price is charged for using the market. The notion of two-sided markets is developed by Rochet and Tirole (2003) and predominantly used to describe various internet platforms, though the notion is applicable to different markets, such as those for credit cards, video game platforms, and operating systems (Cohen, 2017). Rochet and Tirole (2006) defines a market as two-sided "if the platform can affect the volume of transactions by charging more to one side of the market and reducing the price paid by the other side by an equal amount" (p. 664). In the textbook example, a heterosexual dating service is a two-sided market since its success is contingent on an appropriate gender ratio (Rysman, 2009, p. 127). Should the service seek to increase its pool of women, it may do so by lowering their price, and charging men more, thus subsidizing womens' dating. Odabaş et al. (2017b) modify the definition for the application in illicit online markets, and suggest that a market qualifies as such if "a third private actor [...] should act as a market regulator in order to increase market attractiveness" (p. 1283). Thus, pricing structure, set by the third party, and intermediary regulation by the third party are distinguishing characteristics of two-sided markets (Rochet & Tirole, 2003, 2006).

The market type that consistently function as two-sided economies are platforms, though forums may also have such qualities (Odabaş et al., 2017b). By extension, channels and groups may also exhibit these qualities. Platforms are typically organized so that sellers are charged a commission on every sale, and

possible a bond on signing up (Christin, 2013; Martin et al., 2019). Thus, as in the dating agency, one group bears the brunt of the costs (sellers). These costs are then incorporated into the prices sellers charge, and the market administration effectively subsidizes buyers through over-charging sellers (Rochet & Tirole, 2003). There are two implications of this structure which are relevant for this work, the intermediary third party (the administration), and the centralization inherent to platform economies (Rysman, 2009). Pricing structure is particularly crucial for platform economies, because one side of the market is attracted by the presence of the other. This leads to network effects, and typically both sides of the market are attracted to one or a few platforms (e.g. Amazon, uber, Lyft), which is why antitrust regulation is a key policy issue in the regulation of platform economies (Cohen, 2017).

When illicit online markets take on characteristics of two-sided markets, namely the attraction of buyers and sellers through pricing strategies and internal regulation, governance and control becomes crucial. The most extensive literature on governance and power within illicit online markets is found in the cybercrime scholarship, though sociologists and economists have also intervened. Two tendencies within this literature may be emphasized, centralized or decentralized regulation. Odabaş et al. (2017b) suggests that these platforms are on the one hand organized, and subject to regulation by their administration, but also maintained by informal social ties. These are referred to as third-party and second-party controls, and provide the most encompassing conceptualization of governance. Since the platform and forum are the most well-studied, I concentrate my analysis of these, since there is lacking data to rely on for the remaining ideal types.

Concerning governance, each type is of course subject to formal social control, law (Black, 1976). As some markets exist on third-party platforms, such as encrypted messengers and social media, their administrators and moderators are also subject to terms of service, which they will likely break (Stevens, 2016). Websites directly under the control of an administrator, such as platforms and forums, will in turn also be located in a data center somewhere, most likely violating terms of

service or criminal law (Goldsmith, 2000). Thus, when discussing governance in the following sections I focus on the internal regulation of exchange relations within the platform, not the formal social control exercised by the state through seizures and arrests.

### **Centralized governance**

The exercise of centralized regulation is predominantly studied in platforms and forums, while relatively unexamined in the remainder of the ideal types. Organized in a similar manner as platform economies, administrators provide a service rather than a product (Odabaş et al., 2017a). There are variations on how administration is exercised, but one of its roles is functionally comparable to a type of "rent extraction" (Langley & Leyshon, 2017). Administrators will require bonds from sellers, provide additional services in exchange for fees, for example, the right to review sellers, and in platforms they typically charge a fixed commission (Christin, 2013; Martin et al., 2019). In turn, the services provided encompass membership, the right to sell products, escrow systems, and dispute resolution. Upon violating rules and norms, services are retracted and sanction exercised. Odabaş et al. (2017a) argues that this centralized governance is not consistent across markets, but is found on a continuum. The channel and the group fall at the lower end of the continuum, relative to platforms and forums, but are still governed arenas. Administrators and owners of either can ban members and authenticate them, but they do not involve themselves passively in transactions.

Lusthaus (2013) makes the argument that the role of administrators is functionally comparable to Mafia groups extracting rent within their territory. A similar comparison is made by Martin (2014a) who utilizes the nodal governance framework to argue that administrators are comparable to insurgent groups controlling territory. While the comparison to Mafias or insurgents is problematic, given that administrators do not govern territory<sup>2</sup> (Lusthaus, 2013), the argument that they

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<sup>2</sup>Interestingly, the notion of cyberspace as a distinct domain similar to territory can be traced to early internet utopian writings (e.g. Barbrook & Cameron, 2001; Barlow, 2001; Ludlow, 2001).



are functionally comparable is tenable. Mafias have been argued to provide security governance, fulfilling functions typically handled by the state (Aziani et al., 2019), and Reuter (1984) argue the Mafia exercises social control as a third party to transactions. A similar example may be found in the former insurgent group FARC-EP, which scholars have argued provided proto-state services (protection from drug traffickers, market regulation) to coca farmers in exchange for rent or taxes (Gutiérrez D. & Thomson, 2020). Administrators often take on such roles in regulating the economy, namely, through escrow services, dispute resolution systems, and formal sanctioning. Notably, these are offered in exchange for rent, in the form of bonds and commissions. Seeking a historical analogy, the relation between sellers and administration is similar to "patronage systems" or "clientage", in which some protection is provided by an intermediary in exchange for a price, typically observed in primitive modes of government (Tilly, 2005, p. 30-33). As a two-sided market, this regulation seeks to increase the "attractiveness" of the platform (Odabaş et al., 2017b).

The escrow and dispute resolution system are two institutional practices employed in illicit online markets that govern exchange relations (Tzanetakis, 2018b). Four forms of payment exist. First, the product may be paid for in advance, known as early finalization, and colloquially as finalize early (Moeller et al., 2017). Second, a centralized escrow solution may be used, wherein the marketplace administrator acts as a mediator, transferring funds to the seller after a transaction is completed (Tzanetakis et al., 2016). In a third version, voluntary third parties unaffiliated with the administration take this role, so-called "escrow officers" (Lusthaus, 2012). Finally, some platforms have begun offering multisignature escrow, in which two of three encryption keys are needed to finalize the trade (Horton-Eddison & Di Cristofaro, 2017). These are held by the buyer, seller, and administrator. In case of a disagreement between seller and buyer, the administration enters actively to resolve the dispute in a formalized manner through the dispute resolution system

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However, as the internet has increasingly become subject to state regulation, this argument is no longer tenable (Goldsmith, 2000).

(Moeller et al., 2017; Morselli et al., 2017). In each payment mode, risk and power are distributed differently.

Social control is enforced to maintain and enforce adherence to social norms, sanction deviants, and to resolve conflicts (Black, 1976; Ellickson, 1991). Sharing some common ground with the economic approach laid out in Chapter 2, social control theory is a theoretical framework that conceives of social control as shaped by meso- and macro-level structures. For example, Black (1990) highlights how the embeddedness of actors, namely, whether they are in daily contact as well as their group membership, shapes their strategies of informal social control. In the case of illicit online markets, norms that can be violated may be the expectation that others will adhere to exchange expectations, or that escrow mediators act as expected (Bancroft et al., 2020; Tzanetakis, 2018b). As these norms are violated, actors will resolve the conflict in one way or another. They may ostracize the deviant, report them to moderators, or tarnish their reputation in forums (Moeller et al., 2017; Morselli et al., 2017). Black's (1976) definition of social control hinges on a formal/informal distinction in which either the state or nonstate actors regulate deviant behavior, summarized as informal social control being conflict management in the absence of the state (Black, 1983).

In this sense, all conflict resolution in illicit online markets is by definition informal. Yet, the power exercised by the administration is qualitatively different from traditional modes of informal control. For example, Jacques and Wright (2011) describe how drug market participants use strategies such as avoidance, retaliation, or toleration upon norm violation., whereas Moeller and Sandberg (2017) and Dickinson (2017) document threats as social control. Administrators, however, wield more consequential means than the typical users of informal social control, specifically the ability to ban market actors at will, tarnish their reputation, and expropriate their property. In platforms and forums, users are capable of obtaining feedback (discussed in the forthcoming section), and Dupont et al. (2016) describe a "rep fuck"-sanction in which administrators strip the violator of their obtained reputation. Similarly, administrators may also ban sellers who break norms (Moeller et

al., 2017; Morselli et al., 2017). Notably, at this point offenders are breaking not only informal norms, but often specific rules set out by the administration (Martin, 2014a, 2014b). What distinguishes this exercise of social control is **a)** the distribution of power, that is, the administration's capacity to act unopposed, and **b)** the degree of formalization. Later extensions of social control theory suggest abandoning the arbitrary formal/informal delineation (see also Jacques & Allen, 2014), and J. Griffiths (1984) proposes conceiving of the "legalness" of social control on a continuum. Here, the legalness of social control follows the delegation of social control labor to specialists, and as the relational distance between actors grows in social space, so does the division of social control labor (p. 65). Black's (1990) later extensions of social control theory are not as dependent on the state either, and provide some concepts that may be applied.

Beginning with escrow and dispute resolution, these should be approached with power in mind. A simple definition of power is the capacity to enforce one's will (Granovetter, 2017, p. 91). The four variations of payment, advance, centralized, decentralized (escrow officers), and multisignature each distribute power differently. In the first, advance payment, power resides with the seller who may abscond with funds (Moeller et al., 2017). Here, exchange relations are ungoverned. In the centralized version, power resides with the administrator, who can settle disputes as they please<sup>3</sup>. With escrow officers, this power is granted to a community member. In multisignature, the administration's power to abscond with funds is pacified. However, when the administration is activated under centralized escrow, that is, asked to mediate an unsuccessful exchange, it cannot be compared to informal mediation (Black, 1990). The power distribution means the administration has the final say. The seller and buyer do not need to agree. This is comparable to Black's (1990) notion of settlement, in which a third party with power resolves the transaction. Notably, this is a mode of conflict resolution that is exercised within social structures that are hierarchical, marked by unequal power relations

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<sup>3</sup>Administrators, of course, can have an interest in letting a dispute resolve to the benefit of either party, or be pressured to do so.

and social distance (p. 57). In turn, exchange involving mediating third parties that cannot make an absolute decision is more aptly captured by the notion of mediation (Black, 1984).

Administrators also intervene in a sanctioning capacity, notably through the expropriation of property (e.g., funds in an account) and the "rep fuck". Dasgupta (1988) suggests reputation may be considered as capital, and in this sense, both sanctions are best conceived of as a form of expropriation or destruction of property (Black, 1984). Finally, the banning of users is perhaps best captured under a notion of forced exile or banishment (Black, 1990). Arguably, administrators can, and do, exploit their power for their own means, and buyers and sellers have some leverage. An administrator behaving illegitimately and expropriating funds may be sanctioned by sellers and buyers, for example (Moeller et al., 2017). However, as a mode of social control, the resolution of conflicts by administrators is distinguished by a high degree of power imbalance. This power imbalance derives from the fact that **a**) websites remain under their control and is compounded when **b**) the escrow system is centralized. These correspond to typologies of third-party interventions developed by Black (1984) which suggests that the authoritativeness of settlement behavior is a function of the relational distance between the settlement agent and disputing power (p. 23). From this perspective, there is therefore a significant difference between the Mafia and the administration, because the latter is involved in every exchange and sets the rules. The power relation is encapsulated in the minor detail that there is, in fact, a primitive type of property rights operational in some platforms. Cryptomarkets generally utilize either or both a wallet/account system, in which funds are deposited, and a centralized escrow systems. Thus, participation in the market involves yielding property rights to one's money for a brief amount of time (Moeller et al., 2017). Here, a close analogy, in terms of power, might be an insurgent group levying taxes on subjects within its territory, and setting out the rules of economic exchange (Gutiérrez D. & Thomson, 2020).

Escrow and dispute resolution are conflict resolution practices in which a non-state administration stands ready to intervene as a mediator. Conversely, the

authenticating function of administration is an active role (Odabaş et al., 2017a). authentication consists of various mechanisms and procedures, which vary across market types. In forums and IRC Channels, product verification, such as testing whether a stolen credit card is legitimate, is prevalent (Lusthaus, 2012). Yip, Webber, and Shadbolt (2013), for example, describes a forum in which administrators anoint members to verify sellers' products. In another example, Holt and Dupont (2019) examine the application process of a closed hacker forum, Darkode, in which members had to be either recommended or make their case. Other such examples are the assignment of status through the ranking of sellers as, for example, a "trusted vendor" (Odabaş et al., 2017b; Tzanetakis, 2018b).

### **Decentralized governance**

The sanctioning of deviant and norm-violating behavior in illicit online markets is not only performed by administrators and moderators. It is also exercised in a decentralized manner, namely, through modes of conflict resolution and reputation systems. Within the literature, the focus is predominantly on the reputation systems, though Odabaş et al. (2017a) also highlights testing services, in which second parties verify the honesty of a seller. Morselli et al. (2017) further draw attention to social control outside the scope of the reputation system, suggesting that strategies such as avoidance also provide sanctions.

In discussing reputation, it is preferable to separate reputation into informal and formalized (Bakken et al., 2018). The former is reputation in its traditional sociological sense as the networked distribution of information such as negative gossip (Black, 1984; Glückler & Armbrüster, 2003). The formalized reputation system seeks to reproduce this function by aggregating and systematizing the track record of a seller (Resnick & Zeckhauser, 2002). Reputation systems come in different varieties. Typically, they are a summarizing score associated with a forum or platform profile. The feedback and reviews of past exchange partners can be further inspected, and a potential partner can therefore be evaluated on the basis of a record of their past conduct (Sztompka, 1999, p. 72). In forums and platforms,

informal transmission is complimented by the formalized reputation system, but the function is the same: Reputation as a means of informal and decentralized social control (Ladegaard, 2020; Przepiorka et al., 2017).

In his study of the Shasta farming community Ellickson (1991) suggests negative gossip as a mild, but highly effective, form of sanctioning (p. 57). In social control theory, reputation is likewise seen as a way to sanction deviant behavior, and norm violation (Black, 1984). Within illicit markets, drug dealers describe a similar role of reputation. Here, the violation of exchange norms may result in loss of customers, whereas a reputation for high quality drugs or violence may be good for business (Denton & O'Malley, 1999; Moeller & Sandberg, 2019). Reputation has received less scrutiny for markets manifesting as channels, groups, and shops, however it is not unlikely that some can build an informal reputation, for example, through internet forums or word of mouth where they are recommended.

The violation of norms is transmitted within the community or network, lowering the offender's reputation. This introduces a sanction for the violation of norms and deviant behavior, thus regulating actors who will now experience costs if they choose to be opportunists, as their peers begin to avoid them (Simpson & Willer, 2015). Norms are thus upheld by sanctioning deviants. The reputation system has been treated by a contingent of sociologists and economists, who have theorized it further. Diekmann et al. (2014) discuss reputation systems in licit online markets as comparable to the "lex mercatoria" or "law merchant" (Milgrom et al., 1990), informal merchant's courts. Among medieval traders and the absence of state regulation, these would sanction norm violation and deviance (see also Swedberg, 2003, p. 200). Przepiorka et al. (2017) and Hardy and Norgaard (2016) take this thesis further, arguing that whereas licit markets are subject to the law, illicit online markets are not. Therefore, they confirm the thesis that social order may arise spontaneously absent central governance through the state, specifically through reputation.

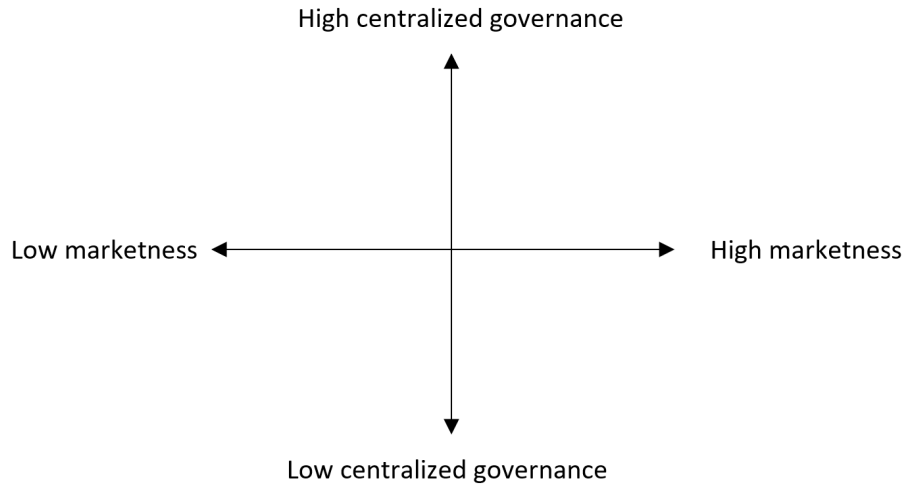
The tension between this conception of social order and the high level of regulation in platforms will be treated in depth later. Briefly, the thesis builds on work by

Milgrom et al. (1990) who argued that the informal institution of the law merchant supported a vast European network of merchants absent centralized authority (i.e. nation-states). This institution functioned as a common repository of reputation and held sanctioning power over merchants through **a)** the registration of dishonest behavior, and **b)** the awarding of damages to the plaintiff, with the caveat that payment could not be enforced by the institution. Less drastic arguments are made by Bakken et al. (2018) who suggest that reputation systems are a more efficient mode of transmitting information on deviance than through networks.

### 3.3 Governance and marketness

Within the preceding sections, I have highlighted how exchange in illicit online markets follows different institutional patterns, what I denoted as prototypical markets. The stability of these forms exemplifies the economic sociological notion of institutions as relatively stable patterns, norms, and rules (Fligstein, 2001; Granovetter, 2017). I then discussed how these different social arenas of exchange may be closed or open, the social roles within them, and their governance, distinguishing between decentralized and centralized means. Based on this discussion, I suggest that these ideal typical forms, and their unique manifestations, may be placed along continua of governance and marketness shown in Figure 3.1. At the axis of governance, markets exhibit different modes of informal and formalized social control. Likewise, they may also exhibit varying degrees of marketness. In this sense, we may see the different qualities highlighted in the preceding sections as pulling markets along these directions.

With regards to marketness, markets may be differentiated by whether they are open or closed (Herley & Florêncio, 2010), whether they allow more rational modes of exchange (Callon, 1998b; Childs, Coomber, & Bull, 2020), and their efficiency (Williamson, 1981). At a very practical level, the Sologne strawberry market is a utile comparison. Garcia (1986) describes the strawberry market as aiming to **a)** make products comparable, **b)** reduce entry/exit costs, and **c)** increasing trans-



**Figure 3.1** – Axes of differentiation for illicit online markets.

parency into the value and price of product. For example, in a shop operated by one seller transparency and comparability is low. Conversely, if the seller was operating on a platform with a thousand other sellers, transparency would be higher, and comparability too. Fundamentally, this dimension is comparable to Moeller’s (2018a) differentiation of drug markets as high or low in marketness.

The prototypical markets may similarly be placed along the continuum of governance, from centralized to decentralized. Disregarding the binary distinction between formal and informal social control (Black, 1976), observing it instead as degrees of legalness (J. Griffiths, 1984), we find that social control across illicit online markets take on different quantities of legalness, and distribute power in different ways. The notion of legalness ties the two continua together, because empirically it correlates with higher degrees of marketness and centralized governance in the markets discussed. Illustratively of this point, Garcia (1986) highlights that the Sologne strawberry market in fact did operate an informal social control apparatus in which the administrative council could exile deviants (p. 11). To some extent, the differentiation across this axis is comparable to the market/hierarchy distinction made by Williamson (1981), and which remains central to studies of illicit markets, networks, and organizations (see Section 2.3). However, there are two differences. First, in this differentiation market-like qualities are allowed to



co-exist with hierarchical ones. In fact, it is expected they will do so. Second, the notion of hierarchy emphasizes a degree of legalness.

Different qualities of markets can be summarized along each axis, and these may be considered as continuous or binary variables in a conceptual sense, allowing us to move beyond the ideal typical distinctions (Kvist, 2007):

- Marketness:
  - The degree and ease to which products and sellers can be compared (Callon, 1998b; Moeller, 2018a). For example, by vetting product quality by community members.
  - The degree of separation between social and economic content (Callon, 1998b). Namely, whether discourse is separated from exchange relations.
  - Socio-technical devices that make products comparable within categories (Tzanetakis, 2018b), and formalized modes of reputation (Bakken et al., 2018).
  
- Governance:
  - The degree to which administrators can sanction norm violators through exile, destruction of property, settlement, and expropriation (Black, 1990).
  - The division of social control labor and formalization of social control (J. Griffiths, 1984; Odabaş et al., 2017a).
  - Whether a platform requires vetting, commissions, or bonds in order to sell products or access (Dupont et al., 2017).
  - The existence of escrow systems and their power distribution (Black, 1990).

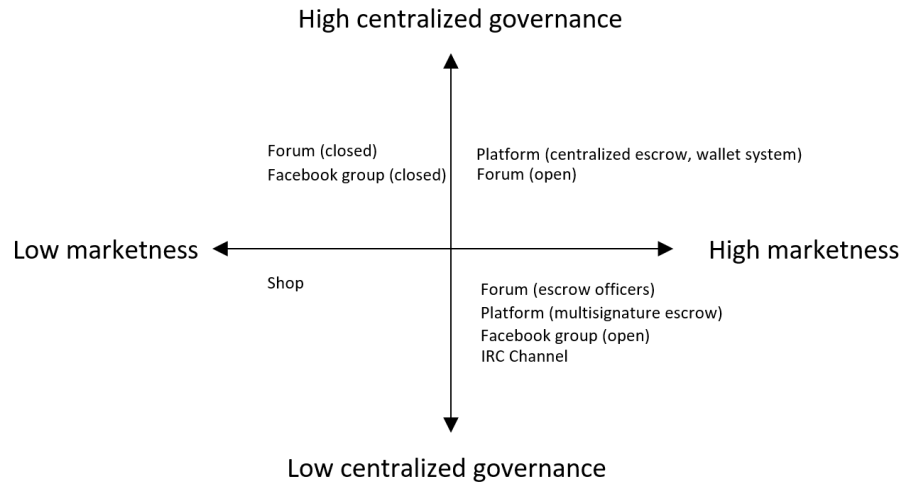
Asking concrete questions, such as how easy seller and product comparison is, and whether social content is sought separated from exchange, how deviants

are sanctioned, and how coordination problems are resolved, these unique discrete manifestations of markets may be placed along the continua. In Figure 3.2 some examples are shown, roughly separated according to whether they as ideal types exhibit comparatively higher or lower levels of governance and marketness. Individual manifestations (e.g. websites and groups) may similarly be placed on the continuum. In the upper left quadrant, high in governance and low in marketness a closed forum and Facebook group are found, similar to those described by Demant and Bakken (2019); Dupont et al. (2017); Herley and Florêncio (2010). Since these reduce the pool of buyers and sellers, and regulate participation actively, they exhibit both low marketness and high governance. In the lower left quadrant a shop is shown. Assuming only one seller offers their goods from the shop product and seller comparability is low, the individual firm may be able to exercise power over the buyer, but they cannot exercise power over other sellers. In this quadrant internet pharmacies may be found. In the lower right quadrant, high in marketness but low in governance a forum with escrow officers, a platform using only multisignature escrow, an open Facebook group and an IRC Channel are found. All these can be accessed freely, and none give administrators property rights through a centralized escrow system, thus placing them low in governance. All allow higher degrees of comparability and comparison because multiple sellers can operate within them at little cost, giving them a higher degree of marketness. Finally, in the upper right quadrant a forum that is open<sup>4</sup> and a platform with centralized escrow are shown. The open quality of both make them high in marketness, while the centralization of power makes them high in governance. In both, administrators wield sanctioning power, and in the platform they can expropriate property.

In all of the cases, characteristics specific to the concrete manifestation should be considered. For example, a platform with two sellers will fall lower on the scale of marketness than one with thousands. Similarly, a shop which resells products from multiple sellers, for example an Autosshop reselling credit cards, will exhibit higher marketness. It may also be argued to have a higher degree of governance,

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<sup>4</sup>No payment method is specified in this case as it is only illustrative.



**Figure 3.2** – Axes of differentiation for illicit online markets.

since it can sanction individual sellers. Internally, within the quadrants, there may also be differentiation. In the upper right quadrant, the platform may be argued to streamline product and seller comparability to a higher degree than the forum, by providing standardized means of identifying products through search functionality (Paquet-Clouston, Décary-Hétu, & Morselli, 2018; Tzanetakis, 2018b).

In general, forums are highly differentiated and cannot be placed within one quadrant exclusively. Closed forums and channels, such as those described by Herley and Florêncio (2010) falls towards low marketness, though not as low as the channels in which one seller promotes product to multiple buyers. Neither do channels present as heavily governed. Forums, in turn, take more market-like characteristics allowing price and seller comparison, formalizing it in the reputation system, yet still embed exchange in a social platform (Soudijn & Zegers, 2012). Platforms, generally larger than forums, allow thousands to compete and reduce search costs further through the platform design (Bakken et al., 2018; Langley & Leyshon, 2017; Paquet-Clouston et al., 2018). Similarly, channels and shops without escrow, reliant on informal reputation, do not operate in the shadow of an administrator exercising sovereign power, whereas sellers in platforms will do so (Odabaş et al., 2017a). Some forums distribute power of mediation through escrow officers ranking them below platforms in terms of governance. Finally, returning

to some examples not included in the typology, the warez economy detailed by Décary-Hétu et al. (2012) and the barter-like exchange of non-consensual sexual images (Dodge, 2020) fall towards low marketness, having noneconomic concerns taking precedence.

### 3.4 Cryptomarkets

Cryptomarkets, also called anonymous online markets (Soska & Christin, 2015) or darknet markets (Rhumorbarbe, Staehli, Broséus, Rossy, & Esseiva, 2016), are the predominant type of platform, and they are almost exclusively found on the dark web (Martin et al., 2019). The first cryptomarket, Silk Road, was a continuation of an online drug economy that has persisted since the early days of the internet, and which gained prominence with the sale of NPS (Martin, 2014a, 2014b; Orsolini et al., 2017). Today, the online drug trade not only flourishes in these platforms, but also manifests as forums, groups, and channels (Bancroft et al., 2020; Demant & Bakken, 2019; Demant et al., 2019). In the following sections, I introduce and discuss the cryptomarket in light of the topics covered until now in this chapter. I begin by briefly discussing the cryptomarket economy in broad terms, emphasizing its resilience, growth, and diversity. Hereafter, I turn towards the social organization of this economy. I conclude the chapter by differentiating cryptomarkets from other illicit online markets emphasizing its social organization. This provides the foundation for the coming discussion of trust in cryptomarkets.

#### 3.4.1 The cryptomarket economy

Precise estimates of the cryptomarket economy are difficult to produce, and since the seizure of the Silk Road, there have generally been more than 10 markets operational continuously, with trade centralized in one or two (Martin et al., 2019). Scholars predominantly rely on observational data collected through webcrawling<sup>5</sup>, aggregating product reviews to estimate the number of transactions,

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<sup>5</sup>Later, in Section 6.1, I provide further details on this methodology.

revenues, and so forth. Essentially, this methodology consists of taking "snapshots" of the website, collecting a mirror of every available page, after which it is parsed and stored in a database (Décary-Hétu & Aldridge, 2015; Munksgaard, Demant, & Branwen, 2016). Using feedback as a proxy for transactions is the traditional measure, though it is acknowledged that it will never reflect all transactions. Kruithof et al. (2016) estimates that 71-81% of transactions can be measured by feedback, a conclusion supported further in extensive work by Stinenbosch (2019). Nevertheless, compared to transactional data traditionally available for illicit markets (e.g. Moeller 2018b who uses video-recorded transactions in a street market), Barratt and Aldridge (2016) argue that scholars have access to unprecedented data on drug transactions with relatively little effort. With these reservations in mind, scholars have documented an economy that is resilient, growing, and diverse.

Though there is no agreed-upon metric for estimating the size of cryptomarkets, the continual growth of the economy is documented by studies that have examined either single or multiple marketplaces, as well as public statements from law enforcement. In the first quantitative study of a cryptomarket, Silk Road, Christin (2013) found a monthly revenue of 1.2 million USD in 2012, suggesting an annual revenue of 15 million USD. At this point, the Silk Road had a monopoly on the dark web drug trade (Martin et al., 2019). In a later study using data collected in 2013, Aldridge and Décary-Hétu (2014) suggested an increase in yearly revenue from 14.4 in 2012 to 89.7 million USD in 2013, a six-fold increase. When Silk Road was later seized by US law enforcement in late 2013, buyers and vendors migrated to a plethora of new markets that opened in late 2013 and throughout 2014. In this period, Demant, Munksgaard, and Houborg (2018) suggested a lower bound of yearly revenue on two cryptomarkets, Agora and Silk Road 2.0, of a combined 132.7 million USD. A later longitudinal study of multiple markets by Soska and Christin (2015) found daily revenues above 500,000 USD throughout 2014. A more recent study by Tzanetakis (2018a) found the revenue of one market, Alphabay, at 94 million USD, over a period of 12 months. Following the seizure of the market, however, Europol (2017) suggested that a "conservative estimation of USD 1 billion

was transacted in the market since its creation in 2014”.

As the cryptomarket economy has grown from millions towards hundreds, and possibly thousands, of millions, law enforcement has become a continual presence. The general pattern that emerges is that while individual platforms are seized, the economy is only impeded for a brief time. Décary-Hétu and Giommoni (2017) find that in the wake of Operation Onymous, the seizure of multiple cryptomarkets, the number of active sellers was back to normal within a month, and sales were twice as high within two months. Martin et al. (2019) observe a general pattern of several markets existing at the same time, with trade being centralized in one or two platforms. Following a seizure, buyers and sellers then migrate to their preferred alternative, and one or two new central marketplaces emerge. Ladegaard (2019a) highlights the speed of these reorganizations, as new markets and sellers generally stand ready to absorb demand after seizures. While the resilience of these markets may be ascribed to the general tendency of illicit markets to reemerge after law enforcement operations (Décary-Hétu & Giommoni, 2017), Ladegaard (2018b) highlights a sense of solidarity and community as conducive to this reorganization. Norbutas et al. (2020b) and Ladegaard (2020) suggest that the transferability of reputation, aided by public key encryption, which can maintain identities across platforms, allows market orders to remain stable social structures unimpeded by the occasional intervention.

Alongside its growth, the cryptomarket economy has continued to diversify. The Silk Road originally broke with convention by providing a platform that catered predominantly in traditional illicit drugs; heroin, cannabis, ecstasy, amphetamines, and so on, as opposed to the NPS economy in shops (Martin et al., 2019). While NPS continue to be sold on cryptomarkets (Dolliver & Kuhns, 2016; Van Buskirk, Griffiths, Farrell, & Degenhardt, 2017), research has continually found that revenue is generated by “classical” illicit drugs, namely cannabis, ecstasy (MDMA), methamphetamine, amphetamine, and cocaine (Demant, Munksgaard, Décary-Hétu, & Aldridge, 2018; Soska & Christin, 2015; Tzanetakis, 2018a). Responding to changes in the offline drug market, scholars have found that demand and supply

for opiates on cryptomarkets was stimulated by US regulation efforts (Martin et al., 2018). Martin et al. (2019) further highlights an increasing use of cryptomarkets to distribute nondrug items, namely, stolen data traditionally reserved for forums. Scholars have also highlighted smaller niches within the ecosystem for tobacco products (Barrera, Malm, Décary-Hétu, & Munksgaard, 2019; Munksgaard, Décary-Hétu, Mousseau, & Malm, 2019), and weapons (Rhumorbarbe et al., 2018).

### 3.4.2 Buying and selling drugs in cryptomarkets

Cryptomarkets belong to the platform type, and for the buyer or seller they present what is, in terms of layout and functionality, an eBay-like experience (Barratt, 2012). A buyer account may be registered with little effort, whereas sellers will typically have to submit a bond on registering (Moeller et al., 2017). Hereafter, the marketplace functions relatively similarly to eBay or other platform markets, with minor modifications. Similar to these markets, the two-sided market organization subsidizes buyers, and the administration takes a position as regulator and facilitator (Odabaş et al., 2017b; Rochet & Tirole, 2003, 2006). Products can be searched for through a classification and search system, and inspected via text and images (Tzanetakis, 2018b). Distribution of physical items is predominantly facilitated using the postal system, whereas digital items may be transferred electronically (Aldridge & Askew, 2017; Décary-Hétu, Paquet-Clouston, & Aldridge, 2016).

Cryptomarkets utilize bitcoin, a virtual currency, for transactions. Essentially, bitcoin is a decentralized currency maintained as a ledger allowing for cheap peer-to-peer transfer of a digital asset (Böhme, Christin, Edelman, & Moore, 2015). While the illicit uses of bitcoin are generally highlighted (e.g. Weimann, 2016), illicit economies utilize a variety of online means to transfer value (Europol, 2015; Holt, 2013). Although bitcoin may not be a functional necessity, it has both advantages and disadvantages. Principally, it provides a relatively anonymous means of transferring funds outside centralized control by financial institutions (e.g. banks). At the transaction level, bitcoin therefore functionally replaces cash. Typically, a buyer transfers bitcoin to their cryptomarket account, after which they can pur-

chase their desired product using either the advance payment, centralized escrow, or multisignature escrow option (Tzanetakis, 2018b). Of note, "escrow officers" are generally not used in cryptomarkets, and the mediator of all escrow exchanges is the administration.

Research suggests that the buyers who use cryptomarkets are predominantly white men in their 20's, with some technical knowledge, mid-to-long educational backgrounds, and relative familiarity with drug use (Barratt, Lenton, Maddox, & Allen, 2016; Maddox, Barratt, Allen, & Lenton, 2016; Van Hout & Bingham, 2013). Martin (2018a) suggests the "gentrification" thesis, that cryptomarkets are a gentrified space for distributing drugs, distinguished by relatively orderly exchange, an absence of violence, and certain norms. This thesis finds support in empirical research, with drug dealers, referred to as vendors, expressing both libertarian and progressive attitudes towards drug use, considering themselves as businessmen, and practicing distinct middle class norms (Martin et al., 2020; Van Hout & Bingham, 2014). Buyers and sellers both report a general absence of violence as an attraction (Barratt, Ferris, & Winstock, 2016; Martin et al., 2020; Van Hout & Bingham, 2014), an abundant product selection, and high quality products (Barratt, Lenton, et al., 2016; Van Hout & Bingham, 2013).

### **3.4.3 Organization and governance in cryptomarkets**

In section 3.3 I highlighted what Odabaş et al. (2017a) term a continuum of governance in illicit online markets. On this spectrum, cryptomarkets fall decidedly towards a high degree of centralized control. As in forums, administrators wield significant leverage over buyers and sellers, whom they may sanction at will through banishment and expropriation. These powers derive from the centralized control of the escrow system, in which administrators overwhelmingly are in control of funds<sup>6</sup>(Moeller et al., 2017). Turning towards the transaction cost perspective, discussed in section 2.3.1, these markets take a particular hybrid form that is not

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<sup>6</sup>The first paper, presented in Chapter 7, provides specific numbers for the number of items across payment modes showing that escrow is the normal.



fully captured by the markets, hierarchies, and networks distinction. As Bakken et al. (2018) highlight, these platforms are both hierarchically organized in terms of regulation, but their competitive structure is more market-like than many other illicit markets. Cryptomarkets therefore exhibit a degree of centralized governance that places them at the extreme in comparison to the other ideal types.

As opposed to groups, channels, and forums, which frequently require some knowledge to enter or are closed to outsiders, cryptomarkets are very open. Consequently, Aldridge and Décary-Héту (2014) suggest they are unique "anonymous open drug markets". As such, they take on a degree of marketness that is unparalleled in illicit online markets, with their closest parallel being the open street market (Aldridge & Décary-Héту, 2016; Childs, Coomber, & Bull, 2020; May & Hough, 2004). This degree of marketness further manifests through a highly organized interface which reduces the time spent searching for products (Paquet-Clouston et al., 2018), combined with the availability of hundreds of thousands of products and thousands of sellers (Demant, Munksgaard, Décary-Héту, & Aldridge, 2018; Tzane-takis, 2018a). Administrators further assign status to sellers (e.g., trusted vendor, trust level), formalize reputation in the reputation system, and isolate exchange from discourse by running separate forums (Munksgaard & Demant, 2016).

However, they do not fall absolutely towards the extreme of marketness. Lusthaus (2012) describes forums that allow distinguished members to verify the authenticity of products, something that is relatively rare in cryptomarkets. Verification, for example, through measuring the purity of a drug, makes products comparable, but is generally not adopted in cryptomarkets. There are instances of sellers, buyers, and groups doing so. For example, Mounteney, Griffiths, and Vandam (2016) describe a group called LSD Avengers, which provide chemical and chromatography tests of different products. Similarly, the market Silk Road 3.1, which two of the articles in this dissertation use data from, operated a service in which they would "verify" products, though the process was somewhat unclear and only existed for a brief time. The Russian cryptomarket Hydra has allegedly superseded all others by centrally organizing testing of drug manufacturing facilities, though the details are

relatively opaque<sup>7</sup>. Nevertheless, verification processes are not institutionalized, in the sense that they are adopted by markets at a general level, and when present, they are not implemented or supported by the administration.

#### **3.4.4 The legacy of Dread Pirate Roberts: The social construction of cryptomarkets**

From the markets and hierarchies perspective, it may seem reasonable to conclude that the cryptomarket evolved to resolve problems of bounded rationality and opportunism while upholding a high degree to marketness and efficiency (e.g. Bakken et al., 2018; Moeller et al., 2017). Whereas this functionalist explanation may seem satisfactory, it fails to explain why other market forms continue to exist. This point becomes truly pressing, as Bancroft et al. (2020) observes a flourishing cryptomarket that not even provides escrow services, and a plethora of alternative market institutions continue to exist; all under the same institutional constraints (Moeller & Sandberg, 2019). At this point, the economic sociological notion of institutions as social constructions becomes informative for understanding the organization of cryptomarkets.

The basic organizational structure of cryptomarkets was laid out in Silk Road and implemented by the administrator Dread Pirate Roberts. Epitomizing the stability of social institutions (Fligstein, 2001; Granovetter, 2017), little innovation upon this basic formula has passed since the Silk Road (see Martin et al., 2019, chapter 1). The most significant changes, the implementation of multisignature escrow in some markets, and the adoption of new cryptocurrencies, constitute only minor innovations with the basic structure remaining robust. For example, multisignature remains relatively unused throughout the ecosystem (Martin et al., 2019, chapter 1). Robert's libertarian ethos is generally discussed as an aspect of culture and community, resistance to the war on drugs, and general libertarianism

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<sup>7</sup>With little scholarship on Hydra, I owe Patrick Shortis, doctoral candidate at the University of Manchester, for this insight. Without thorough research it cannot be established to what extent this feature is legitimate, but it is a novel development.

(Maddox et al., 2016; Martin, 2014a), though a more radical perspective is suggested by Zaunseder and Bancroft (2019) and Munksgaard and Demant (2016). In his writings, Robert's referred to the science fiction novel *Alongside night* (Schulman, 1999), and cryptomarkets are strikingly similar to institutions described in the book. Here, a shadowy group of free market anarchists, agorists, operate hidden black markets seeking to deprive the state of its capacity to extract rent, taxes, and thus its lifeblood. Silk Road was analogous to these bazaars; hidden, untaxed, dealing in illicit goods, a point which Robert's himself expressed publicly and frequently (Greenberg, 2013).

If the premise is accepted, that Robert's modeled Silk Road after an obscure science fiction novel, the construction of Silk Road can be seen as analogous to the Sologne strawberry market – the implementation of an economic vision through a process of framing economic exchange (Callon, 1998b). This particular libertarian vision of economics as politics, which Robert's himself expressed (Greenberg, 2013), and which Schulman's (1999) agora epitomized, is a free market under the supervision of a sovereign power. Here, democracy is exclusively exercised through economic action (Pace, 2017; Zaunseder & Bancroft, 2019). From this perspective, the streamlined marketplace in which goods can be compared easily, and a central authority exercises power, is the continuation of politics through the framing of economic exchange (Callon, 1998b). Instead of a neoclassical economist, however, an agorist free-market libertarian implemented this market institution and framed exchange. Had Robert's been an neoclassical economist, Silk Road may have resembled the Sologne strawberry market more than Schulman's agorist bazaar, for example, by prioritizing the homogenization of products (Garcia, 1986), and leaving less room for sellers to specify the purity and quality of their product themselves (Fanselow, 1990; Geertz, 1978). Consequently, the cryptomarket's position on the axes of governance and marketness is the conclusion of a particular economic vision, not the outcome of optimization and economizing. Efficiency is retained by this analysis, but the origin of organization is traced to their social construction, rather than a function of optimization (Callon, 1998b; Garcia, 1986; Langley & Leyshon,

2017). This analysis builds on the problem of explaining institutions, discussed in Section 2.3.1, and a problem suggested by Bakken et al. (2018): How can hierarchical control in cryptomarkets be reconciled with a high degree of marketness? Within the transaction cost framework this is difficult, but the pragmatic approach I suggested, conceiving of illicit institutions not as functions of optimization but as social constructions, resolves this problem.

### 3.5 Cryptomarkets as arenas of exchange

Within this chapter I have presented an ad hoc typology of illicit online markets. Building on this typology, I discussed the characteristics that differ across these market institutions. Drawing on social control theory, transaction cost economics and economic sociology, I have highlighted how the social organization of illicit online markets frames exchange in particular ways (Callon, 1998b): Forums embed exchange in networks and discourse, escrow changes power relations, and cryptomarkets take a unique structure. Proceeding from a general discussion of cryptomarkets, I discussed their institutional characteristics, the degree of centralized governance, a disembedding of exchange in the platform structure, and the manner in which these qualities may be approached as a matter of framing exchange. Using these tools, it is possible to situate markets on two continua, marketness and governance, and the cryptomarket falls comparatively at their extremes: Centralized governance and market-like qualities. This analysis thus highlights several characteristics which will be important in forthcoming chapters:

1. Illicit online markets may be more or less efficient in terms of competition (Herley & Florêncio, 2010). Cryptomarkets are more efficient because **a)** they allow ready comparison of sellers, and **b)** provide safeguards against opportunism through the escrow system (Bakken et al., 2018).
2. Illicit online markets are situated on a continuum of centralized governance from none to high (Odabaş et al., 2017a). Its exercise is captured by the concept of social control as a continuum of legalness. Cryptomarkets exhibit

comparatively high degrees of centralized governance and legalness (Bakken et al., 2018; Moeller et al., 2017).

3. These qualities may be seen as responses to market frictions by economizing on transaction costs, but may also be seen as socially constructed institutions (Munksgaard & Demant, 2016; Zaunseder & Bancroft, 2019).

The implications for trust will be treated later, though they begin to appear: What are the implications of centralized governance for trust? How does the ready access to informal sanctions affect beliefs about the honesty of exchange partners? What are the implications of moving from hierarchical and networked modes of entry? What are the consequences of increased marketness? Will contracts remove the need for trust?

What begins to emerge when the cryptomarket is compared to other illicit online markets, and in particular when contrasted to the premodern exchange modalities of traditional illicit markets discussed in Chapter 2, is an unprecedented degree of modernization. The Sologne strawberry market is in this sense an apt analogy, since it captures the deliberate social reorganization of the economy (Callon, 1998b; Polanyi, 2001). This is not a social organization that encourages networked exchange, nor a market that encourages discourse and exchange to coexist like the forum, but a radical vision of how exchange should take place – streamlined and atomized, more similar to the online markets of platform capitalism than the premodern drug market. As the strawberry market, traditional modes of informal social control become formalized and exercised under increasingly formalized and legal-like (Garcia, 1986).

## CHAPTER 4

### TRUST

To discuss trust in a single chapter is a daunting endeavor. The complexity and nuances of trust make up the seminal works of sociologists, and the size of the endeavor is captured by the suggestion that Luhmann never managed to integrate one of his major contributions to sociology, his early work on uncertainty and trust, into his grand theory of systems (Morgner & King, 2017, p. xii). Scholars such as Misztal (1996) and Sztompka (1999) provide detailed analyses, each in their own direction, and I follow a general framework outlined in the sociology of trust (see also Lewis & Weigert, 1985). However, I also draw on insights from information economics and game theory, institutional theory, and studies of cooperation and prosocial behavior. As I proceed in this chapter, I reference practical examples drawn from illicit markets, online or offline, to situate theory in arenas of exchange. As I pursue the task, I refer to the preceding chapters, weaving economic and social organization into a general narrative of the problems of trust, its scope, function, and production. On this basis, the next chapter will present an analysis of the production of trust in illicit online markets.

The aim of this chapter is to examine, summarize, synthesize, and integrate towards a theory of trust in cryptomarkets and illicit online markets. A principal concern in this endeavor is from what conceptual and theoretical vantage point trust should be approached. Put differently, what is the question asked, and what are the assumptions the question presupposes. As opposed to a psychological or social psychological concept of trust as a disposition, I take the explicit point of departure that trust is a question of social relations, not a psychological disposition (Lewis & Weigert, 1985). In other words, trust may be enacted in individual behavior, and it is based on an individual cognitive process, but it cannot be separated from a larger social structure (Misztal, 1996; Möllering, 2005b).

This is a position that emphasizes the external, rather than internal, forces

conducive to human action and cooperation (Simpson & Willer, 2015), and thus distinguishes itself from economic and psychological approaches to these, and by extension, the parts of criminology inclined to these (Dwyer & Moore, 2010a; Garland, 2001; Hayward, 2015). The position I take follows the economic sociological approach and draws on Granovetter's (1985) discussion of under- and oversocialized conceptions of social action. The economic sociological position departs from a critique of both the oversocialized conception of social action as almost predetermined by social structure, the sociological tendency, whereas the undersocialized one assumes action is driven by internal forces, utility maximization or psychological predispositions (Wrong, 1961).

I begin the chapter by discussing the problems facing actors in the social arena of illicit online exchange, information asymmetry and opportunism. Trust is defined in relation to uncertainty, and on this basis I proceed to define trust. Hereafter, I elaborate on the production of trust. I then discuss how trust can be measured, and the strategies scholars employ in the study of trust. I conclude the chapter by drawing attention to the socially productive function of trust.

#### **4.1 Uncertainty**

In the preceding chapters, bits and pieces have insinuated towards a notion of uncertainty. Within the transaction cost framework uncertainty arises out of opportunism and bounded rationality (Dow, 1987; Williamson, 1981). When uncertainty grows to an uncomfortable quantity, actors will switch to hierarchical or networked modes of organizing exchange, which is how criminologists generally explain illicit exchange modalities (Bichler et al., 2017; Moeller, 2018a). Similarly, within the economic sociological approach, Beckert's (2013) notion of coordination problems hinges on reducing uncertainty, for example, about the value of a product and cooperation. The notion of stable worlds, or arenas, of exchange, similarly highlights an uncertainty that actors need to resolve in the search for stability (Beckert, 2009; Fligstein, 2001). Across these orientations what remains uncertain is the future

(Luhmann, 1979), and the problem of trust is that there exists a "perennial epistemological gap" (Sztompka, 1999, p. 19). The actions of a doctor, a lover, and a drug dealer, and the social systems and networks they are embedded in, are fundamentally unpredictable.

Uncertainty is not synonymous with risk, and the two must be separated. Risk is a calculable property, for example, the odds of losing in a game of roulette (Beck, 2007, p. 17). Uncertainty, however, is incalculable because it is introduced by the unpredictable and uncontrollable actions of others (Sztompka, 1999, p. 21). The "uncanny potential for diverse action" of the other, as Luhmann (1979, p. 43) put it<sup>1</sup>. In that sense, risk relates to roulette, and uncertainty to the outcome of a football match. One is an appeal to chance or hope, whereas the target of a bet has a history, known qualities, and perhaps holds a particular place in the bettor's heart or mind (Sztompka, 1999, p. 19). Uncertainty may be transformed into risk, but that is a cumbersome social process. Carruthers (2013), for example, describes the sophisticated process of transforming uncertainty about firms into credit ratings. Similarly, Guseva and Rona-Tas (2001) detail credit card institutions in post-Soviet Russia and the United States, showing how the latter has managed to transform the uncertainty about the unpredictable actions of credit card users into manageable risk through standardized information and credit reporting. In the latter, social ties, bureaucracy, and deposits, instead determine the right to credit.

Thus, uncertainty is either a latent or explicit element of the theories discussed in the preceding sections. It is a sense or estimate about what the future holds. It does not derive from natural facts or precise calculations, but is introduced by the disturbing repertoire of actions that others have at their disposal (Möllering, 2005a). In the context of exchange, two problems emerge, both mentioned in Chapter 2, opportunism and information asymmetry. Opportunism is the assumption that some actors can be dishonest (Williamson, 1981), whereas information asymmetry refers to the unequal distribution of information in an exchange relation

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<sup>1</sup>Interestingly, Sztompka's (1999, p. 23) translated version of Luhmann (1979) refers to a "disturbing" rather than uncanny potential of the other.



(Akerlof, 1970). There are further variations and conceptualizations of these, for example, Dimoka, Hong, and Pavlou (2012) suggest seller uncertainty and product uncertainty, a sentiment developed by Schilke, Wiedenfels, Brettel, and Zucker (2016) as well, who separate performance uncertainty and product uncertainty. Thus, it seems that in exchange relations there are two concrete uncertainties that are of interest, the product and the seller. The source of both is the absence of the state (Beckert & Wehinger, 2013; Fligstein, 2001; Reuter, 1984).

#### **4.1.1 Products and uncertainty**

The problem of information asymmetry appeared in the preceding sections, and the notion may be traced back to Akerlof's notion of "lemon markets" (Akerlof, 1970). Akerlof uses the example of a market for used cars in which quality cannot be assessed by the potential buyer. Consequently, buyers need to incorporate risk into their decision-making. This may induce a pressure on prices, similar to the "risk tax" of the risks & prices framework. Consequently, honest sellers are pushed out of the market because their payout does not reflect the value of their product. The market thus grows inefficient, or fails, as honest sellers must lower prices or exit the market (Ben Lakhdar, Leleu, Vaillant, & Wolff, 2013).

The notion relates to the transaction cost economic notion of bounded rationality (Williamson, 1981), as one may argue that rationality is bounded by the inability to properly assess products. For example, Herley and Florêncio (2010) argue that opportunism introduces a "ripper tax" in stolen data markets. Here, sellers exploit the absence of regulation, and the inability to evaluate product, to sell subpar data. Dimoka et al. (2012) define product uncertainty as "the buyer's difficulty in assessing the product's characteristics and predicting how the product will perform in the future" (p. 401). It is again invoked by Beckert and Wehinger (2013), who argue that the coordination problem of valuation in licit markets is a problem of agreeing on values to products, rarely reflective of their actual costs, such as wine and art (Beckert, 2009), whereas in illicit markets the problem concerns information and price estimation, namely whether price reflects quality (Beckert &

Wehinger, 2013, p. 16). Drawing on information economics, Schilke et al. (2016) highlight that asymmetries are different across product classes. Search goods, such as commodities, have relatively stable expectations attached to them. Conversely, experience and credence goods, which can only be evaluated after the purchase, are more uncertain. Fanselow (1990) demonstrates these problems in effect in the study of a bazaar, arguing that products that are standardized (e.g., through a brand, uniform quantities) are relatively certain because the seller cannot manipulate them. A seller cannot easily adjust the number of cigarettes in a pack, nor change the content of a Coca Cola. A standardized product, like a bottle of Coca Cola, would therefore suggest high product certainty, whereas a stamp of heroin is significantly more uncertain (Ciccarone et al., 2017; Wendel & Curtis, 2000).

Probing product uncertainty and information asymmetry, drugs emerge as distinct products. Caulkins (2007) considers drugs to be experience goods for which quality can only be assessed after consumption or use. Ben Lakhdar (2009) suggests drugs may also qualify as credence goods, meaning that the price paid "translates also the beliefs of the users about the quality of the good they buy" (p. 2). In other words, buyers may believe price is an indication of quality, and they will feel as such. As an example of this complexity, Bancroft and Reid (2016) show how the purity and quality of illicit drugs are perceived and constructed, rather than objectively experienced. In other words, purity may correlate with experience to some extent, but there is variation. Both search and credence goods are distinguished by high degrees of product uncertainty (Schilke et al., 2016), but it is more complex than in Akerlof's market. Sellers may not be aware of product quality, since "cutting", the dilution of products, is often found in the layers above them somewhere between retailers and producers (Adler, 1993; Broséus et al., 2015).

The thesis I laid out in Section 2.2, that the state is constitutive of illicit markets, is informative for understanding product uncertainty in illicit markets, because is neither inherent to illicit drugs nor markets. Rather, it is a consequence of the illegalization of production and distribution. For example, legalized cannabis can be standardized across potency, weight, and effect, and can therefore be compared

(Smart et al., 2017). Similarly, cigarettes diverted from legal production retain legal qualities, such as being produced within a regulatory framework (Joossens & Raw, 2012). The illegalization of market crimes, as discussed, is not a binary but differentiated (Naylor, 2003). Production may be legal, for example for weapons and cigarettes, establishing a higher level of product certainty for diverted goods, as opposed to illegally produced goods like drugs (Cook, 2018; Reuter & Caulkins, 2004). States and institutions support stable exchange conditions, for example, through product standardization and regulation (Timmermans & Epstein, 2010). In their absence, these actors are constitutive for the product uncertainty in illicit markets (Fligstein, 2001; Guseva & Rona-Tas, 2001).

Ben Lakhdar et al. (2013) argues that "illicit drug markets have all the characteristics required to become a market for lemons" (p. 647), but still do not become failed markets. Informal social control, namely, through reputation, and the embeddedness of drug trade in social networks, prevents such market failure (Moeller, 2018a). Honesty is encouraged by reputation, and incentivized by iterated transactions (e.g. Adler, 1993; Denton & O'Malley, 1999; Moeller, 2018a), and exchange is hard to separate from dense ties of friendship, effectively providing a strong guarantee of quality (e.g. Jacques & Wright, 2015; Scott et al., 2017). However, the cost is that efficiency decreases because competition is impeded (Beckert & Wehinger, 2013; Reuter & Caulkins, 2004).

In illicit online markets, these traditional supports to product certainty are no longer available, but the fundamental qualities that may provoke a lemon market into emerging persist: Absence of regulation and standardization, imperfect information for both buyer and seller, and quality is unknown until consumption (Ben Lakhdar et al., 2013). Moreover, these problems are compounded, not only because of the inherent difficulties of presenting the product using text and images (Dimoka et al., 2012), but because the traditional modes of resolving the coordination problem, networks, reputation, and embeddedness, are now unavailable. To render exchange possible, this problem of valuation must be resolved and uncertainty reduced (Bakken et al., 2018; Tzanetakis, 2018b).

### 4.1.2 Sellers and uncertainty

Invoking the practice of cutting drugs, product and seller, or performance, uncertainty begin to overlap, as was the case for the "ripper tax" (Herley & Florêncio, 2010). These are distinct concepts, but they are interwoven (Dimoka et al., 2012; Schilke et al., 2016). For example, someone in a drug distribution network may dilute substances, acting in an opportunistic manner, and as a consequence generate product uncertainty (e.g. Denton & O'Malley, 1999). This practice is an example of opportunism, an exhaustively documented practice in illicit markets (e.g. Adler, 1993; Broséus, Gentile, & Esseiva, 2016; Caulkins & Reuter, 2006; Rhumorbarbe et al., 2016). The state is, as with product uncertainty, constitutive of the opportunism of illicit markets, though scholars highlight different nuances.

Fanselow (1990) argues that the absence of standardization may create an incentive structure for opportunism. When sellers compete in unstandardized products, they are inclined to compete, not in prices against each other, but in products against customers: Subtracting some weight, overselling the quality, and so forth. Wendel and Curtis (2000), for example, documents heroin retailers copying each others stamps, to "parasitically" profit of the value creation of sellers who provide high-quality products (Beckert & Wehinger, 2013, p. 12). Thus, the trade in uncertain goods itself is conducive to competition between seller and buyer, since products cannot be compared. If a state was to intervene, set regulatory standards, for example, this might change the organization of competition, and thus create another form of stability (Timmermans & Epstein, 2010). Economic sociologists and criminologists will emphasize the absence of courts and contracts, but Fanselow's example also shows that smaller details can have significant repercussions.

Whereas transaction cost economics, and economics generally, refer to problems of opportunism and malfeasance (Granovetter, 1985; Williamson, 1981), Beckert and Wehinger (2013) denote it the coordination problem of cooperation (see also Beckert, 2009). Here, economic sociologists and criminologists converge as the absence of the state, its stabilizing functions or formal social control, are seen as

the root of opportunism. Specifically, the absence of contracts, courts, judges and property rights (e.g. Jacobs et al., 2000; Jacques et al., 2014; Morselli et al., 2017; Naylor, 2003; Reuter, 1984).

Opportunism in illicit markets comes in a variety of forms: Lying about product quality, theft, rip-offs, dilution of product, violence, defaulting on debts, and so forth. For example, without a court, there is no legitimate coercive force to ensure a drug debt is paid (Moeller & Sandberg, 2017), and a drug dealer can with little risk rip off a buyer (Jacques et al., 2014). What is distinct about these is that they are redistributive or predatory crimes, and thus fundamentally distinct from illicit exchange, as discussed in Section 2.5 (Jacques & Wright, 2008; Naylor, 2003). The correlation between predatory opportunism and voluntary resource transfer is a consequence of the absence of the state, which would otherwise stabilize exchange (Beckert & Wehinger, 2013; Fligstein, 2001). Jacques et al. (2014) suggest opportunists tend to target socially atomized market actors (see also Coomber & Moyle, 2017; Spicer, Moyle, & Coomber, 2019), and it is generally posited as one of the reasons why illicit markets take networked forms (Moeller, 2018a). As with product uncertainty, opportunism can be restrained by engaging in repeated exchanges, and changing the incentive structure (Reuter & Caulkins, 2004). However, this introduces inefficiencies, since competition is limited and precautions have to be taken. Actors also turn towards informal modes of social control (Black, 1983). For example, violence can be an effective, though costly, means of ensuring cooperation (Jacques & Wright, 2011; Levitt & Venkatesh, 1998), and even the threat thereof can be an effective deterrence (Moeller & Sandberg, 2017). Nonviolent sanctions, however, carry less of a risk to the victimizer, and more modest means such as ostracization can help resolve the cooperation problem (Dickinson, 2017).

In illicit online markets, opportunism manifests in a myriad of ways, and Moeller et al. (2017) detail these intricacies in the cryptomarket context: First, sellers may require advance payment and not send product. A typical case, the "exit scam", involves absconding with all funds sent in advance payment after having an extraordinary sale (Ormsby, 2014). A large-scale iteration involves platform

administrators simply expropriating all funds in centralized escrow (Van Buskirk, Bruno, et al., 2017). This is a unique variation that epitomizes the potential of hierarchical organizations to create internal opportunities for opportunism. As Dow (1987) argues, criticizing the transaction cost framework, “[any] organization which relies on internal authority as a means of resource allocation must face the question of who guards the guardians” (p. 24). More ingenious types of predation may be to send an empty letter. Further sophistication, involves sending the letter, with tracking, to the wrong address. Should the buyer dispute the transaction, the seller can provide proof that a package was indeed sent, and that it is in fact the buyer who is the opportunist<sup>2</sup> (Moeller et al., 2017). A seller can also rip off a subset of buyers, a few percent, thus maintaining reputation, “selective scamming” (Morselli et al., 2017). Espinosa (2019) estimates a 83% probability that a randomly selected seller would fail to send product, and perhaps these are the same victims that Jacques et al. (2014) suggest are ripped off in illicit markets, those with the wrong attitude or no existing social ties. There are also examples of buyers acting opportunistically against sellers, either by threatening their reputation or claiming not to receive their product (Martin et al., 2020). Opportunism is not alien to stolen data markets either, wherein scamming is known as “ripping” and its practitioners as “rippers” (Herley & Florêncio, 2010).

Illicit online markets, like the anonymous street trade or social supply, exist outside the law. However, the means of informal social control which might traditionally support cooperation and deter opportunism, from excessive violence to the social embedding of exchange, are now unavailable, or at least significantly weakened (Beckert & Wehinger, 2013; Black, 1983). There is not an immediate capacity for violence, nor a social network in which gossip can spread. Buyers and sellers must therefore use new methods to ensure cooperation (Bakken et al., 2018).

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<sup>2</sup>This trick will work when a postal tracking system does not show the delivery address.

## 4.2 Defining trust

Some authors manage to summarize trust in a few sentences, and a selection is shown in Table 4.I. Others, like Misztal (1996); Sztompka (1999) and Luhmann (1979) produce longer works to elucidate the nuances of trust. However, the sociology of trust is best conceived of as a continuing endeavor, rather than separate ruptures (Möllering, 2017, p. 408). Sztompka (1999), for example, draws on Luhmann (1979), whereas both Luhmann (1979) and Möllering (2017) draw on Simmel's brief notes on money (Misztal, 1996, p. 49). Finally, Misztal (1996) trace trust even further back to the foundational questions of social theory and sociology at the transition to modernity.

Inspecting each definition yields separable components: Trust involves potential harms, exists in relation to others, involves expectations about the future, and implies action. Sztompka (1999) argues that trust is one of three attitudes one may take to the future (p. 24). One may have hope, confidence, or trust. Hope is not rationally justified, whereas confidence is a detached expectation. These are "contemplative, detached, distanced, noncommittal" attitudes, and "fall within the discourse of fate" (Sztompka, 1999, p. 25). Conversely, if agency is at play, the unpredictability of others renders the future uncertain, and trust is the attitude one must take. Formalizing the sentiment in his rational choice framework, Coleman (1994, p. 99) suggests three components are involved in the decision to trust:

- a) The probability of the other acting as expected
- b) The potential loss.
- c) The potential gain.

These are the fundamental elements of a bet, how Sztompka (1999) conceives of trust, but as in a bet, **a**) is not easily estimated (Coleman, 1994, p. 102). Here, the uneasy relationship between rationality and trust emerges, specifically in the use of the term risk, because the question is whether the future can be calculated. Risk

Authors	Definition
Rousseau, Sitkin, Burt, and Camerer (1998)	"Trust is a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another." (p. 395)
Granovetter (2017)	"[...] trust is the belief that another person with whom you might interact will not cause you harm even though he or she is in a position to do so." (p. 58)
Sztompka (1999)	"Trust is a bet about the future contingent actions of others" (p. 25)
Möllering (2017)	"Trust can be defined [...] as a state of favourable expectation regarding other people's actions and intentions." (p. 404)
McEvily, Perrone, and Zaheer (2003)	"[...] trust is the willingness to accept vulnerability based on positive expectations about another's intentions or behaviors" (p. 92)
Coleman (1994)	"Situations involving trust constitute a subclass of those involving risk. They are situations in which the risk one takes depends on the performance of another actor." (p. 91)
Good (1988)	"[...] trust is based on an individual's theory as to how another person will perform on some future occasion." (p. 93)
Hardin (1993)	"[You] trust someone if you have adequate reason to believe it will be in that person's interest to be trustworthy in the relevant way at the relevant time." (p. 505)
Simpson and Willer (2015)	"Trust: an individual's expectation that an alter will act in a benign or cooperative way when the alter has an incentive to act otherwise." (p. 44)
Tilly (2005)	"Trust consists of placing valued outcomes at risk to others' malfeasance, mistakes, or failures. Trust relationships include those in which people regularly take such risks." (p. 12)

**Table 4.I** – Exemplar definitions of trust.



is calculable, uncertainty is not (Beck, 2007, p. 17). Möllering (2005b) forcefully argues that when rationality is exclusively used to explain trust, it is in fact calculativeness, rather than trust, which is conceptualized. If we talk of risk or potential harm when defining trust, this is therefore not a rational calculation, but rather a subjective estimate about the future actions of others. Thus, the terminology of the potential future appears more consistent, if one assumes that it is the potential of harm, and the subjective estimate thereof, that is the key point, rather than a rigid rationality/emotionality distinction. Trust is therefore better conceived of as encompassing both rationality and emotionality, while acknowledging that the setting determines their relative importance (Granovetter, 2017, chapter 3). In an emotional setting, a family or intimate relationship, calculation and probability likely figure less than in an exchange relation (Sztompka, 1999, p. 42). Thus, belief, theory, subjective probability, or expectation; these are attitudes towards the future and may encompass both rational and emotional components.

Trust is defined in relation to the other. This is expressed in terms like vulnerability (McEvily et al., 2003; Rousseau et al., 1998), harm (Granovetter, 2017), risk (Coleman, 1994) or contingent actions (Sztompka, 1999). All derive from the action or inaction of the other. Within exchange relations, these are the uncertainties discussed in the former section, specifically, that others may act in a harmful manner. Practical examples are not sending drugs, "rip-offs", and the dilution of drugs. Trust is a bet, not a gamble or calculation (Sztompka, 1999). In our context, it is the bet that an exchange partner will act appropriately. Thus, trust is reserved to social relations where there is a potential for harm. In other situations, one might trust another to not reveal a secret (Gambetta & Przepiorka, 2019), or to stand ready should a third party act in a harmful manner (Young & Haynie, 2020). In these situations, the function of trust is to allow action under immense complexity (Luhmann, 1979; Misztal, 1996). For example, there is no manner in which the probability of a cryptomarket dealer acting opportunistically can be accurately calculated or predicted. Espinosa (2019) manages to approximate risk, suggesting 83% chance of opportunism, but even that number is likely unable to

dispel uncertainty.

To act under uncertainty, one must suspend doubt and act as if the future was certain (Möllering, 2017). Without such an attitude, one "would be prey to a vague sense of dread, to paralyzing fears" (Luhmann, 1979, p. 5). The social and psychological function of trust is to allow action under conditions of complexity. This notion of trust as a means of complexity reduction (Luhmann, 1979), overlaps with the discussion of transaction cost economics (Williamson, 1981). Here, social complexity and uncertainty motivate organization, whereas in the Luhmannian sense, trust is an alternative to excessive contracting and regulation, less anxiety-producing, and more efficient. Implicit in most definitions, but explicit in that of Sztompka (1999), trust involves a behavioral dimension (Lewis & Weigert, 1985). Möllering (2017) labels this a "leap" or "suspension", whereas Sztompka (1999) uses the term "bet". This is the acting upon the beliefs or theory about the other. To be trustworthy, is then to be worthy of this bet. To distrust is to be disinclined to wager, a "negative bet" as Sztompka (1999, p. 26) puts it.

As these components of trust are traversed, it becomes evident that most theories of trust discuss the same problem, but approach it in different manners and with slightly changing vocabularies (Rousseau et al., 1998). Some put emphasis on risk and calculation (Coleman, 1994; Hardin, 1993), whereas others emphasize complexity and social cohesion (Luhmann, 1979; Sztompka, 1999). The grand discussions about trust instead revolve around measurement (Lewis & Weigert, 1985; Misztal, 1996; Uslaner, 2008; Zucker, 1986), rationality (Coleman, 1994; Luhmann, 1979; Möllering, 2005b), the relation between agency and structure (Lewis & Weigert, 1985; Misztal, 1996; Sztompka, 1999; Tilly, 2005), and the production of trust (Zucker, 1986). However, by reorganizing these components, we may posit that: Actors are, based on their subjective estimates, more or less inclined to act as if the future actions of another are certain. This renders the trust problem of illicit markets apparent: Actors in illicit markets, and cryptomarkets by extension, operate in conditions of high uncertainty. What is the basis of these subjective estimates that allow actors to bracket uncertainty?

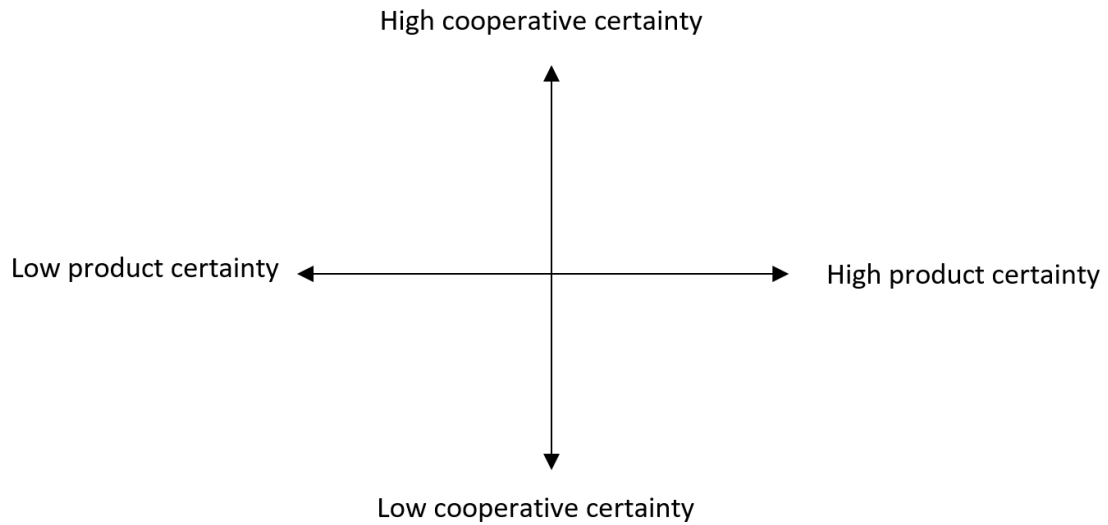
### 4.3 The production of trust

In the two preceding sections, I have laid out the problems of trust produced by uncertainty and defined trust. The decision to trust hinges on beliefs, a subjective estimate of the future actions of the trustee, and we may conceive of trust production as the **development of positive beliefs that increase the probability of suspending uncertainty and acting as if the future was certain**. Preceding any acting upon such expectations, there is a "cognitive process which discriminates among persons and institutions that are trustworthy, distrusted, and unknown" (Lewis & Weigert, 1985, p. 970). This is the basis of one's "theory of the other" (Good, 1988). The two sources of uncertainty may be conceived of as two continuous variables, illustrated in Figure 4.1, that inform the cognitive process.

Estimates are subjective, and the availability or absence of institutions, regulations, and social ties may push an estimate either way. Turning towards the illustrative example of Akerlof's (1970) market for lemons, Dimoka et al. (2012) suggest, and show empirically, that introducing third-party inspection of used cars reduces asymmetry. On Figure 4.1, this would push the estimate further right, as opposed to an uninspected car, with significant price implications. Importantly, as highlighted in Section 4.1, the two axes are not easily separated, but should nevertheless be distinguished. In the following sections, I will discuss the production of trust through institutions and networks. There are different sources of trust, and scholars will apply different typologies, or restrain themselves to one definition, and my separation is purely practical (Granovetter, 2017, chapter 3).

#### 4.3.1 The institutional production of trust

The notion of trust has either been a latent or explicit theme in the sociology of what is described as the great transition; the transition from premodernity to modernity and capitalism. This transition involved immense and rapid social change; urbanization, immigration, the modern state, and free markets (Zucker, 1986). In his seminal work, *The Great Transformation*, Polanyi (2001) argues that



**Figure 4.1** – Axes of certainty.

the transition to capitalism was not a natural progression, but rather a violent disembedding of the economic from its traditional social context. Notably, Polanyi saw this as a politically driven process, not as historically determined, making the link to economic sociology apparent (Callon, 1998b; Fligstein, 2001; Granovetter, 1992). Zucker (1986) argues that this emerging social order necessitated functional solutions to the problems of trust that emerged as the traditional bases of trust eroded. A set of new institutions therefore emerged and took on an increasingly important role: Courts, law enforcement, contracts, lawyers, market regulation, law, and so forth. Misztal (1996) argues a similar point, identifying trust as a central theme in early sociological and political writings concerned with the same theme (e.g., Durkheim, Weber, Simmel). In turn, a similar notion is found with Luhmann (1979) who argues that an increased social differentiation, social complexity, necessitates such institutions. Simplifying these notions, we may argue that the social atomization and increased complexity that followed modernity destabilized the traditional bases of trust; social ties, kinship, family, neighborhood, and so forth, the community which Polanyi (2001) argued the economy was embedded in.

The thesis that formal institutional formal trust production functionally re-

places premodern modes is not alien to criminology either. Black's thesis (1976), that as informal social control decreases, formal social control, law, grows, supports the same conclusion: that law emerged to and functionally replaces traditional modes of conflict resolution (Ellickson, 1991). The roots of these changes are thus found in the social atomization inherent to free markets, increased social differentiation, and the complexity of modern capitalist production (Polanyi, 2001). These changes necessitated functional solutions to traditional modes of handling uncertainty (Luhmann, 1979; Misztal, 1996; Zucker, 1986).

Courts, contracts, and money epitomize the complex function of institutional trust production. First, from the social control perspective, opportunism is restricted by these formal external forces, courts, and contracts, which should in turn reduce uncertainty (Black, 1976, 1984). Sociologists, however, extend the thesis further by arguing that these institutions can become so deeply ingrained that they no longer figure in calculations of trust. Zucker (1986) has a unique perspective on trust, drawing on notions of intersubjectivity and what may be summarized as "background expectations" that are held in common (p. 7). Consequently, trust can be produced, and Zucker (1986) argues that "the economy at its origin was shaped by mechanisms, including new organizations, designed to rebuild, to produce trust" (p. 4). Thus, Zucker (1986) argues that these mechanisms and organizations actively produced trust and reestablished order and expectations. Such expectations are intersubjective, stabilizing interactions between actors through common expectations and a taken-for-grantedness of the behavior of others. Misztal (1996) extends the notion of trust, further incorporating a Bourdieusian habitus. Here, trust is "a protective mechanism relying on everyday routines and tacit memories, which together push out of modern life fear and uncertainty as well as moral problems" (p. 102). Thus, routines and habits (e.g., using money), support and produce a general sense of trust towards the social world because predictability increases.

From the sociological perspective, it is therefore not only the fact that an opportunist may be brought to justice by court and contract. It is also the expectation that most people are not opportunists, and the subconscious assumption thereof. This

makes the notion of trust in "abstract others" (Misztal, 1996; Sztompka, 1999), institutions, their representatives or groups, and more fundamentally, "system trust", relevant. The classical example, drawn from Simmel, being money (Misztal, 1996, p. 50). Money necessitates a large social infrastructure that is hardly graspable by the individual, or as Luhmann (1979) argues, "a cross-section of the whole economic system in all its complexity can therefore be placed literally in the individual's hand by means of money" (p. 55). A loss of trust in money as a means of exchange is therefore detrimental, but it is generally of no concern to most people in stable societies. Money is an example of what Luhmann (1979) calls "system trust", trust in abstract complex systems that is so routinized it is no longer a cause for concern (p. 56). A more practical example is provided by Granovetter (2017) with the example of an out-of-court divorce settlement. Here, the parties are well aware that there exists a legal and institutional framework they can draw on, a "backdrop" to trust, should the other violate norms (p. 69). Thus, the parties may settle out-of-court, swifter and less costly, but still have access to controls if norms are violated.

Thus, social institutions emerge and resolve the coordination problems produced by the conditions of modernity, the trust problems of modern markets; opportunism and social atomization. These are, namely, contracts, courts, and state intervention, more generally (Fligstein, 2001; Zucker, 1986). These institutions stabilize the social arenas where actors are now disembedded from the traditional context, not only by restraining opportunism, but also by producing a world in common (Beckert, 2009). After all, it rarely happens that money loses its value or that someone violates a contract. These come together to produce a "backdrop" of trust, and the causal relation is therefore simple: Modern institutions produce trust by reducing the problems of bounded rationality and opportunism. Hereby, they create not only stability through formal means, but also by institutionalization and internalization of stability. These increase subjective estimates of trustworthiness and allow action under immense complexity (Luhmann, 1979). This is historically the sociological conception of social order as resting on the internalization of expectations (Granovetter, 1985; Wrong, 1961), and there is a distinct similarity to the economic

sociological notions of stable worlds of exchange to be found here (Beckert, 2009; Fligstein, 2001).

### 4.3.2 The production of trust in networks

Network structures, as discussed in Chapter 2, are typical organizational structures in illicit markets: Social supply, the exchange of drugs in friendship networks (Jacques & Wright, 2015; May & Hough, 2004), repeated exchanges in the upper layers of the drug economy (Adler, 1993), and networked modes of organization (Bichler et al., 2017; Bright & Sutherland, 2017; Natarajan, 2006). Similarly, actors in illicit markets rely on informal reputation for sanctioning and quality estimates, and exchange is embedded in norms, social ties, and status orders, which can all support trust (Adler, 1993; Adler & Adler, 1980; Denton & O'Malley, 1999; Moeller & Sandberg, 2019). As such, when criminologists talk of trust, social networks, community, and interpersonal relations are central (Moeller, 2018a). This centrality is unsurprising, given that illicit markets share commonalities with premodern, not modern, markets (Beckert & Wehinger, 2013). Like Polanyi's (2001) premodern economy, illicit markets tend to remain embedded in community and locale; networks.

Historically, economic sociologists have argued that actors still utilize networks to produce trust, despite modernization and its consequences. As Granovetter (1985) states, "social relations, rather than institutionalized arrangements or generalized morality, are mainly responsible for the production of trust" (p. 491). The contention is therefore that the thesis presented in the former section, the institutional production of trust, neglects the fact that economic action still remains embedded in social ties. The capacity of networks and social ties to produce trust originate in several functions. First, networks allow the propagation of information, such as negative gossip and reputation (Dickinson & Wright, 2015; Ellickson, 1991). Second, when exchange is embedded in networks, exchanges tend to be repeated, changing a game of Prisoner's Dilemma to a repeated game (Frey, Buskens, & Corten, 2019). Third, networks may emerge from kinship or be group-based, al-

lowing trust to be based on group memberships or characteristics (Granovetter, 2017, p. 65). These are all interrelated, rendering the network concept something that should be carefully applied.

Information propagation may be approached as a means of social control through reputation (Simpson & Willer, 2015). That is, deviants are sanctioned through propagation of information, reputation (Ellickson, 1991). For example, Denton and O'Malley (1999) describes a female drug dealer who on reselling bad products had to regain trust from customers, and the importance of maintaining "street capital" or reputation is well documented in illicit markets (Bourgois, 2003; Sandberg, 2008). In this context, network relations become empirically relevant, since their density and structure may allow the propagation of information about an actors trustworthiness (Frey et al., 2019). Since illicit markets and organizations are highly networked, information propagation is crucial. Malm et al. (2017) for example, show that perceptions of risk posed by law enforcement vary among cannabis growers contingent on their position in social networks. Thus, networks allow information propagation, instrumental for informal social control (discussed in Section 3.2.2), which produces two outcomes of relevance for trust. First, a status of trustworthiness, how well an actor would fall across the two axes, traverses the network (Glückler & Armbrüster, 2003). One could think of this as an average level of expectation in purely quantitative terms from which individuals deviate (Young & Haynie, 2020), and/or consider it as information that is also processed and interpreted internally by a recipient (Hardin, 1993; Möllering, 2005b). Second, the knowledge or belief that an actor will be sanctioned for norm violation may produce a general level of expectation and reduce cooperative certainty (Buskens & Raub, 2002; Dasgupta, 1988).

An important component of networks is the notion of the transitivity or transferability of trust (Sztompka, 1999). That is, information is weighted. Some information is simply better than other information, and it is of higher quality because the transmitter is a trusted actor. For example, Dickinson and Wright (2015) highlight that drug dealers actively use gossip in decision-making, but differentiate it



based on "distance between the dealers and the subjects and sources of gossip" (p. 1275). Thus, Glückler and Armbrüster (2003) differentiate between public and networked reputation. The former is free-floating, yet still useful, whereas the word of a trusted friend or exchange partner carries more weight (Granovetter, 1985).

The second function of interest is when exchange is treated as repeated rather than a single event. The single event may be expressed as a prisoner's dilemma, a basic "game" applied by social psychologists, sociologists, and economists (Glaeser, Laibson, Scheinkman, & Soutter, 2000; Kollock, 1994; Lewis & Weigert, 1985). In a one-off game both actors are likely to defect as it is in their interest. However, when engaging in repeated exchanges both partners see a future gain in acting cooperatively (Raub, Buskens, & Frey, 2019). A variation of the trust game, the investment game, that is argued to better represent exchange, allows the trustor to send X amount to the trustee. The amount is tripled by the experimenter, and the trustee can choose to send money back. In either case, the knowledge that the game is repeated changes the incentive structure (Masuda & Nakamura, 2012).

Buskens and Raub (2002) suggests that at the level of the dyad within a social network, repeated exchanges allow control and learning effects. The former is the trustor's ability to not return to the partner, thus sanctioning potential deviance. Learning effects, on the other hand, consists of learning about the trustor through exchange. Similarly, Glückler and Armbrüster (2003) refers to experience-based trust, a more broad state of commitment between two exchange partners, noting the authenticity of experience (p. 279). Zucker (1986) discusses a similar mechanism, often referred to as process-based trust (e.g. Möllering, 2005a; Nash, Bouchard, & Malm, 2017), in which ongoing exchange relations produce trust between the parties. As Möllering (2005a) summarizes it, when "trusted others live up to expectations of beneficial behavior, trust will increase" (p. 262). In turn, learning and control effects may be generalized to the network (Buskens & Raub, 2002), in which members can learn about another's, or sanction them by spreading negative gossip (Ellickson, 1991). A practical example of these functions and the investment game is provided by Adler (1993), who describes how drug dealers that

have acted with integrity, paying back debts and honoring commitments, become preferred partners (p. 103). Thus, uncertainty is reduced by the accumulation of information (learning) and social control.

Finally, networks frequently stand in for notions of community, which in turn may involve informal practices and norms (e.g. Bancroft et al., 2020). In this sense, it is not the network structure, but rather the network as a group (Granovetter, 2017, p. 66). A kinship relation, or belonging to a group (e.g., a subculture, a neighborhood, a cultural milieu), will often overlap with networks, and these are often observed in illicit markets. Sergi and Storti (2020), for example, note that some organized crime groups, like the Mafia, are often defined by ethnicity. Similarly, Schoenmakers et al. (2013) observe a loosely organized network among Vietnamese cannabis cultivators. The point is not that ethnicity or culture predisposes one to crime, but that when push comes to shove, one may find a cousin or nephew more trustworthy than the anonymous stranger of modern markets (Zucker, 1986). As Granovetter (1985) puts it, "[in] the family, there is no Prisoner's Dilemma because each is confident that the others can be counted on" (p. 490). The tendency to extend higher expectations towards one's kin hinges on other trust-producing mechanisms. For example, a family member has more to lose by acting opportunistically, and norms within a community may establish expectations in product (Bright & Sutherland, 2017; Taylor & Potter, 2013). When exchanges occur in networks and communities word will spread fast, which can have detrimental financial consequences for opportunists since reputation will punish them (Adler, 1993; Denton & O'Malley, 1999). As such, the properties of networks begin to converge; social control, norms, kinship, belonging, information propagation, status hierarchies – the network, as a concept, may stand in for all. Embeddedness within the network can be therefore trust producing, and the embeddedness of exchange can be socially productive by building trust (Granovetter, 1985, 2017).

#### 4.4 Studying and measuring trust

Trust consists of several components, a backdrop, a subjective estimate, cooperation, active mechanisms that promote trust, and a leap, and for each there exist subcomponents. Yet, as Granovetter (2017) notes, researchers prefer reductive definitions, preferably summarized in one variable (p. 59). When trust is conceived of as encompassing agency and structure, and a property of social relations (e.g. Luhmann, 1979; Misztal, 1996), then empirical study seems severely limited (Zucker, 1986). These may hardly be summarized in a single dependent variable. Nevertheless, scholars show little restraint and measure trust in unique and novel ways.

Trust frequently involves cooperation or collaboration, and thus cooperative behavior is often treated as a proxy or manifestation of trust. Criminological scholarship in the context of exchange leans towards this approach as well (von Lampe & Johansen, 2004), drawing particularly on Gambetta's work on cooperation and trust (1988a; 2009), which appears a natural extension of the occupation with deviants who frequently need to collaborate. There are exceptions to this, and a noteworthy divergence from this strand is Young and Haynie (2020), who ask about expectations in specific others within a prison. Outside criminology and illicit markets, sociologists, psychologists, and economists also emphasize cooperative behavior, which may be conceived of as either a proxy or a manifestation of trust, the behavioral dimension of trust (Lewis & Weigert, 1985). It is frequently studied in laboratory contexts using games, namely, the trust game, investment game, and the prisoner's dilemma. The conditions may be altered, the game can be iterated, norms can be introduced, the game may be simulated, and so forth, to model how cooperation, and by implication trust, is produced and reproduced. A frequent application is to involve network structures, to assess how cooperation emerges in larger social structures. Kollock (1994), for example, has research subjects play a trading game in consecutive blocks, finding that exchange structures varied contingent on product certainty. For example, uncertain products were as-

sociated with repeat exchanges and more emphasis on reputation. Simpson and Eriksson (2009) introduce contracts to investment games, and find that removing contracts leads to lower investments. Modifications of trust games allow exploring more specific questions. Gambetta and Przepiorka (2019) use a modified trust game to show that the sharing of compromising information can support cooperation (see also Gambetta, 2009). Ermisch and Gambetta (2016) combine trust games with survey data, finding that individuals with a high income relative to past income exhibit higher trustworthiness (i.e., acting as expected).

Laboratory experiments may be criticized for lacking external validity, and experimental vignettes, from which subjects choose an alternative, have therefore been applied (Aguinis & Bradley, 2014; McEvily, Radzevick, & Weber, 2012). Keijzer and Corten (2017) use vignettes to simulate a licit online market testing whether socio-economic status predicts cooperation. Buskens and Raub (2002) and Buskens and Weesie (2000) use vignettes for used cars to test the control/learning thesis at both the dyadic and network level. Finally, cooperation may also be studied simply using surveys. Dimaggio and Louch (1998) use data from the General Social Survey and find that many exchanges, especially for uncertain commodities, are within-network exchanges. Another experimental approach is the use of agent-based modeling, which Norgard et al. (2018) use to simulate drug markets in an online and offline context, finding that different network structures emerge based on reputation and geographical restrictions.

A critique that may be levied at the emphasis on cooperative behavior is its relative disconnect from belief and cognition, and by extension, the emphasis on rationality and game-theoretic approaches to exchange behavior. The critique is levied forcefully by Lewis and Weigert (1985), who argue that "[if], as the sociological conception of trust holds, trust is essentially social and normative rather than individual and calculative, we would not expect it to manifest itself strongly in experiments where strangers are brought together to interact in the absence of prior social relationships among them and according to the norms of the experimental situation". Put briefly, if trust is a property of social relations and structure, then

making socially disembodied anonymous strangers play decontextualized games in a laboratory is not an ideal design. However, merely taking cooperation outside the lab to observe it does not necessarily solve the problem. As Rousseau et al. (1998) remarks, "cooperation may result from a variety of reasons unrelated to trust, such as coercion (e.g., court-ordered compliance)" (p. 394). Returning to the differentiation between risk and uncertainty, the question is therefore whether laboratory experiments measure calculativeness, rather than trust (Möllering, 2005b). Furthermore, while the above studies extend to include norm enforcement and social networks (e.g. Buskens & Raub, 2002; Gambetta & Przepiorka, 2019), these still operate within the vocabulary of rational choice theory; information, optimal outcomes, interest, and so forth. Considering the credence given to emotion, culture, norms, and the backdrop of trust (e.g. Luhmann, 1979; Misztal, 1996; Sztompka, 1999), cooperation does not capture these elements. The presence of such a backdrop is suggested in a meta-analysis of trust games by N. D. Johnson and Mislin (2011), wherein trustors deviate extensively depending on the country where the experiment took place. It seems that even in the laboratory something is brought along by research subjects.

The country-level variation suggests, in combination with the sociological critique of a focus on cooperation, that perhaps beliefs are a more productive avenue for the study of trust. Beliefs have, in particular, been studied by sociologists and political scientists, drawing on standardized measures and international surveys, and the 1990's and 2000's saw a sharply increasing occupation with these measures. In the United States, the General Social Survey (GSS) includes measures for institutional, political, and generalized trust. Similar items are used in the European Value Survey (EVS), and such items form the basis of the study of trust at a macrolevel. Terminologies vary, social trust, generalized trust, institutional trust, and political trust are frequently used concepts. These terms refer to more or less abstract others, ranging from the loosely defined "most people" (Delhey, Newton, & Welzel, 2011), to political and social institutions (Sztompka, 1999). These measures therefore represent a reduction of intersubjective meanings and background

expectations, discussed in Section 4.3.1, into measurable quantities (see for example Sztompka, 1999).

At a more general scale, these are seen as indicators of social capital, which is predictive of social equality, productivity, and social cohesion (Coleman, 1988; Stolle, 1998). The emphasis on beliefs also intersects with global developments, namely, the fall of the Soviet Union and the emerging liberal democracies in the former Soviet Republics. These were characterized by low levels of generalized and institutional trust, the context in which both Misztal (1996) and Sztompka (1999) made their contributions. Similarly, the continually declining trust in American society has occupied scholars, with Putnam's *Bowling Alone* starting a scholarly discussion (Stolle, 1998). Some concerns in these studies have been whether such attitudes are dispositional, relatively static, or subject to continual change, experiential (Uslaner, 2008), and problems of measurement (e.g. Delhey et al., 2011; Glaeser et al., 2000).

Robinson and Jackson (2001) use items from the GSS to examine the temporal trends in responses to questions about whether most people can be trusted, assumed to be helpful, or inclined to take advantage. Controlling for cohort effects, the authors find a tendency towards declining generalized trust in American society. Hooghe and Oser (2017) examine generalized trust, political trust (trust in federal government, supreme court, and congress), and partisan strength using the GSS as well. They again find weakening generalized trust, and that more partisan respondents tend towards lower generalized trust. Sønderskov and Dinesen (2016) use the ESS and find that trust in institutions seems to drive increasing generalized trust. Sztompka (1999) develops the notion of "trust culture", and proposes a complex conceptual model of how generalized and political trust is produced and reproduced through an elaborate interplay of differing social factors. The production of abstract forms of trust is a longstanding debate (Uslaner, 2008), with some scholars finding that generalized trust is a relatively static disposition though some variation occurs over lifetimes (Dawson, 2019).

There is an ample literature using beliefs, typically from survey data, to mea-

sure trust in generalized others (most people) and institutions. These responses, while relatively reductive when compared to the sophisticated theories that motivate their use (e.g. Misztal, 1996; Sztompka, 1999; Zucker, 1986), are useful metrics on a macroscale (Uslaner, 2008). An interesting finding from this position is the performance of institutional representatives (e.g., a doctor representing the medical establishment) in the production of institutional and generalized trust (e.g. Sønderskov & Dinesen, 2016; Toubøl, 2019). Here, it is the process of encountering the representative that builds, for example, institutional trust. Yet, there are issues associated with measuring trust through survey items, namely, whether they can explain behavior, and what these responses actually mean (e.g., is trust based on cultural expectation, experience, or rational calculation).

The most serious challenge is whether these attitudinal measures can predict cooperative behavior. Glaeser et al. (2000), for example, finds that beliefs are more predictive of acting honestly, rather than acting as if others were honest (i.e., being an honest salesman, rather than a trusting customer). Similarly, McEvily et al. (2012) combine survey questions and trust games, and find that the more general the group at which trust is directed, the weaker the correlation between attitude and cooperative behavior. Similarly, measures of belief confront the problem that what they measure, while simple and cheap, may be interpreted in different ways (e.g., who are most people). Delhey et al. (2011) highlight that the radius of trust varies across countries, and Carlsson, Demeke, Martinsson, and Tesemma (2018) stress the need to ask more direct questions concerning institutions, providing evidence through a combination of survey and experimental data. Examining the interpretation of attitudinal questions, Frederiksen (2019) combines qualitative research with multiple correspondence analysis, and find that generalized trust varies in its scope, the nature of "general", as well as how individuals justify trust, on the basis of norms or assumptions of rational cooperation.

Thus, whereas the critique that may be levied at cooperative measures is that cooperation may arise out of other motivations, the critique of attitudinal measures may be that attitudes and cooperative behavior are not strongly correlated.

#### 4.5 Why study trust?

Trust is conceptualized in different manners, though often the core ideas are in fact quite similar. Instead, disagreements seem to revolve around what elements are emphasized, how to measure trust, and how to resolve these disagreements. Nevertheless, scholarly, and common sense, is inclined to the position that trust is good, though Hardin (1993) interjects and stresses that pure naivete is not. Sztompka (1999) argues that absent trust, one is inclined towards functional alternatives to ensure cooperation, litigation, obsessive control, bribery, and so forth (p. 117). In other words, an absence of trust necessitates complex social arrangements of protection. As the transaction cost framework highlights (Williamson, 1973, 1981), such modes of organization are inefficient because they introduce frictions. A similar example can be drawn from Geertz (1978), who documents the necessity of costly information search in the bazaar to identify a seller and product. In these cases, functional insurances to cooperation or exhaustive information search, the socially productive function of trust becomes apparent: If all parties to a negotiation assume goodwill and future norm-abiding behavior, then contracts and legal institutions are formalities rather than controls (Granovetter, 2017; Zucker, 1986). Similarly, if one was to operate under Hardin's (1993) naive trust, information search in the bazaar would not be necessary. Of course, in both cases, such assumptions and expectations are only good if they have merit. That is, if trustworthiness is in abundance or easily identified.

If trust is merited, however, it can be socially productive because it allows complex actions and systems, epitomized in money (Luhmann, 1979). The Terms of Service for websites do not need close inspection, one can encounter formal institutions and expect them to act appropriately, handing out just sentences or treating citizens properly (Carlsson et al., 2018). One can trust a doctor, and by extension the medical establishment, to vaccinate one's child (Larson, Cooper, Eskola, Katz, & Ratzan, 2011). In reverse, as Luhmann (1979) argues, to not have trust in any of these would subject one to paralyzing fears (p. 5). Rarely does



anyone encounter the world with such dread, but the absence or disintegration of trust was a scenario that haunted sociology from its foundation (Misztal, 1996), and continues to resurface across disciplines as generalized trust erodes, and societies experience declining trust in key state institutions (Stolle, 1998; Sztompka, 1999). Wu's (2020) finding, that gun violence undermines generalized trust with lasting repercussions, is an even darker iteration of this problem.

Trust therefore overlaps with some foundational concerns in social theory, but also what is referred to as the problem of social order (Misztal, 1996), or the Hobbesian problem (Granovetter, 1985), and remains a pressing theme in the face of social change. Simpson and Willer (2015) therefore places trust as one of the "micro-level manifestations of social order" (p. 45), epitomizing the dilemma between egoist concern and optimal outcomes for the collective. To trust is to bracket concerns and to act as if it was certain that the other would pursue the common good, without concern for their own selfish motivations. As Wrong (1961) notes, social theory and moral philosophy begin to overlap at this point, and it is not a surprise that the promotion of a trusting and trustworthy society seems a just, and perhaps apolitical, cause (Misztal, 1996; Sztompka, 1999).

For criminologists who study illicit markets trust is a central theme because it is seen a precondition of cooperation (Gambetta, 2009; Gambetta & Przepiorka, 2019; von Lampe & Johansen, 2004). In settings where actors are faced with an absence of contracts, courts, and property rights, how is exchange possible? And how are these problems resolved? Empirically, trust is therefore thrust to the foreground, because it is clear that not only does the trustee have a disturbing repertoire of potential actions, they also appear much less constrained (e.g. Naylor, 2003). One might suggest that as opposed to the sociologist pondering why economic actors refrain from opportunism, and continue to trust despite its presence (Granovetter, 1985), the criminologist instead ponders how Adler's (1993) upper-level drug dealers and traffickers manage to have a relatively well-functioning market in these conditions (see also Bouchard et al., 2020; Jacques & Wright, 2008, 2011). Put alternatively, how the outlaws came to resolve the Hobbesian question.

As uncertainty appears the default state, the analytical puzzle is how stable arenas of exchange come to be, and how they are maintained, in such conditions (Beckert & Dewey, 2017b; Beckert & Wehinger, 2013). Thus, while trust is an individual attitude towards the future (Sztompka, 1999), it cannot be separated from social structure (Lewis & Weigert, 1985). This quality renders trust a particularly useful analytical tool, because it involves both structure and agency. Questions such as how disputes are resolved absent a formal court system, how exchange can function absent contracts, are not only questions of social organization, but also of trust (Moeller, 2018a; Moeller & Sandberg, 2019). Approaching them as socially embedded resolutions to coordination problems, as proposed in Section 2.6, rather than assuming ideal or optimal resolutions, acknowledges the heterogeneity of illicit markets. In turn, this centers the concept of trust as an analytical tool for understanding both action and structure in illicit markets (Moeller, 2018a).

It is not surprising that trust has become even more central to scholarship as illicit markets move online (e.g. Lusthaus, 2012; Moeller et al., 2017; Norbutas et al., 2020a; Yip, Webber, & Shadbolt, 2013). Disembedded from the traditional social structure that produces trust and stability, whether it is norms and culture (Moeller & Sandberg, 2019; Scott et al., 2017), the exercise of social control (Jacques & Wright, 2011; Reuter, 1984), or the close-knit relations of exchange in larger communities of like-minded individuals (Adler, 1993; Scott et al., 2017). These traditional bases of trust are rendered impotent, negligible, or irrelevant as the new arena of exchange offers more choices than ever (Barratt, Lenton, et al., 2016), and exchanges transpire between anonymous strangers (Diekmann et al., 2014; Resnick, Kuwabara, Zeckhauser, & Friedman, 2000). Evidently, there is trust, since cooperation flourishes and markets grow in social complexity. Consequently, the motivating question of this work emerges: **How is this trust produced in illicit online markets absent the traditional mechanisms that support trust?**

## CHAPTER 5

### THE PRODUCTION OF TRUST IN ILLICIT ONLINE MARKETS

In the preceding three chapters I have laid out the framework for the contribution of this dissertation. I began by discussing illicit markets, and situating them within an economic sociological framework as illegalized arenas of social exchange. I then proceeded to review the literature on illicit online markets, arguing that they may be differentiated across axes of centralized governance and marketness. I situated the cryptomarket as an institutional form that is, comparatively, centrally governed with distinct market-like characteristics. Moving to the topic of trust, I defined and illuminated two intersecting uncertainties faced by buyers in illicit online markets. This provided the point of departure for a discussion of trust, its definition, and production.

In this chapter these themes will converge as I present the agenda of this dissertation. I begin by discussing the production of trust in illicit online markets. Hereafter, I identify two central components, active trust production and exchange, around which my analysis will revolve. Building on these two, I propose a conceptual model for the production of trust in illicit online markets. I then proceed to outline the overarching research question, and present my strategic approach to the analysis of trust production in illicit online markets. The thesis of this chapter is that the cryptomarket modernizes the premodern organization of illicit markets. This necessitates rethinking how trust is produced in illicit markets.

#### 5.1 The production of trust in illicit online markets

The analogy invoked in Section 3.4, the cryptomarket as a modernization of exchange conditions, provides a frame for conceiving of the production of trust in cryptomarkets and illicit online markets. As discussed in Section 3.2.2, opportunism is restrained by centralized governance and reputation systems, while con-

flict resolution is formalized (Bakken et al., 2018; Moeller et al., 2017). These are fundamental transformations; contracts are implemented; reputation transformed into a formalized institutional repository; courts are erected as dispute resolution is institutionalized; sanction is exercised by an administration; and centralized escrow introduces property rights. The social bases of trust are functionally replaced (Luhmann, 1979). Consequently, the correlation between high marketness and high governance becomes analogous to the general sentiment in the sociology of trust: That increasing social atomization and market-like conditions followed from modernization, and that institutions step in to produce trust (Misztal, 1996; Polanyi, 2001; Zucker, 1986). In this sense, cryptomarkets begin to resemble modern, rather than premodern, modes of resolving coordination problems (Beckert & Wehinger, 2013; Ladegaard, 2020). The thesis that cryptomarkets revolutionize or transform the drug trade (e.g. Martin, 2014a) can therefore be taken further. Their framing constitutes, paraphrasing Polanyi (2001), *a great transformation of drug markets*, through an unprecedented degree of modernization.

These functional replacements can be approached in two manners. They may be seen as substitutes or supports of trust (Zucker, 1986), or they may be conceived of as antithetical to trust. Kollock (1994), for example, notes the complexity of this issue in laboratory experiments. They find that formal regulatory capacity increases certainty about products, though not significantly, but in turn decreases interpersonal trust. Depending on whether one considers trust as exclusively an interpersonal phenomenon, or as a quality of systems or fields (Zucker, 1986), trust may be seen as either undermined by the institutional production of trust (see also Kuwabara, 2015), as functionally replaced, or as taking another form (Luhmann, 1979). Möllering (2005a) suggests that this dualism, control versus trust, should instead be treated as a duality. Control and trust refer to each other, as seen in, for example, the notion of informal social control through reputation supporting trust, or contracts institutionalizing expectations (Simpson & Willer, 2015; Zucker, 1986). If trust is considered more than an interpersonal phenomenon (Lewis & Weigert, 1985), the complex cryptomarket in itself may be approached as trust producing,

and as formalizing trust production to an unprecedented degree in illicit markets (Bakken et al., 2018; Ladegaard, 2020; Moeller et al., 2017; Tzanetakis, 2018b). In other words, the cryptomarket holds the potential, through its stabilization of the social arena of exchange, to construct worlds in common despite their social atomization (Möllering, 2005b). Put simply, escrow systems normalize expectations of honesty, ideally making escrow only a formality (Zucker, 1986).

The bet of trust is contingent on a cognitive processing of information, regardless of whether it relies on experience, reputation, informal social control, or a proto-legal system (Sztompka, 1999, p. 69). Granovetter (2017) argues that scholars frequently treat trust as if "only trust caused by their favorite reason should be called "trust" at all" (p. 59). Consequently, I take an inclusive approach assuming that multiple sources of trust may inform the subjective estimates of trustworthiness, but try to condense these formally. Based on the reasoning that actors need to estimate the certainty of both successful cooperation and satisfactory product (Dimoka et al., 2012; Schilke et al., 2016), the following sections elaborate on the production of trust in illicit online markets. Here, I conceive of the production of trust in a practical manner, as social processes, mechanisms, roles, and institutions that increase certainty in either seller or product. Each section begins by discussing trust in the abstract, after which empirical findings, and the literature are discussed, stressing for both whether cooperative or product certainty is produced.

### **5.1.1 Administration and trust**

Lusthaus (2012) argues that administrators introduce trust in illicit online markets, a point reiterated by Odabaş et al. (2017a). Odabaş et al. (2017a) suggest two functions of administrators, authentication and mediation which produce trust. The former consists of vetting processes and ranking systems (e.g. Dupont et al., 2017), while the latter is the combination of dispute resolution and escrow. Thus, the centralized governance discussed in Section 3.2.2 produces trust. They do so primarily by increasing cooperative certainty.

The primary example is escrow, the mediating function of administration (Od-

abaş et al., 2017b), which Diekmann and Przepiorka (2019) compares to contract law. Escrow restricts the ability to defect on promises and act opportunistically, though it does not eliminate them (Morselli et al., 2017). Verification that a seller has performed as expected under the contract can be provided by postal tracking, but as Moeller et al. (2017) notes, such a package can be empty. In a very practical sense, escrow therefore predominantly supports cooperative certainty, receiving the package, because administrators cannot evaluate product quality, the content of the package. Chemical purity can not be ascertained without an extensive control system in place, and if administrators had to incorporate the subjective experience of purity as well they would be facing an even more complex task (Bancroft & Reid, 2016; Ben Lakhdar, 2009). The escrow system further involves dispute resolution, what may be seen as a primitive court-function in which a third-party rules on whether the contract was broken (Diekmann & Przepiorka, 2019). The administration of cryptomarkets may therefore be considered a source of trust, analogous to modern institutions, containing both the potential to control opportunism and to institutionalize trust (Williamson, 1981; Zucker, 1986).

The other role of administration is authentication, discussed in Section 3.2.2. Authentication consists of entry requirement, verification of products and identities, and the creation of a status hierarchy (Odabaş et al., 2017a). Entry requirements in illicit online markets may be vetting based on either recommendations, or bonds paid to an administrator for the right to exchange (Gilbert & Dasgupta, 2017). The latter is utilized in cryptomarkets, and effectively reduces cooperative uncertainty because it increases the cost of defection as an opportunist cannot begin to scam without a start-up investment (Bancroft, 2020, p. 80). Status hierarchies are constructed by ranking sellers as trusted or high-performing, usually based on a set of known metrics (e.g. a high average rating). These allow differentiating sellers without meticulous review of their performance. A comparable example is credit ratings, which are produced by intermediaries and rank lenders according to models that have historically grown more complex (Poon, 2007). Combined, these provide a backdrop to trust (Granovetter, 2017), as every market participant can

rely on the assumption that the administration is actively policing deviants and norm-violators. Should an exchange partner act unexpectedly, the administration can be called upon. In other words, when administration is available, one may assume cooperation will be less risky.

There is generally no administratively organized control of physical products in cryptomarkets. Drugs may be tested chemically, but this is done in an informal manner. "Super reviewers" share their estimate of product quality, or sellers and buyers publicize chemical tests of purity (Aldridge, Stevens, & Barratt, 2018b; Bancroft, 2020; Bancroft & Reid, 2016). The decentralized manner in which quality is assessed means that there is no central regulation of quality, leaving room for fraud and rip-offs (Moeller et al., 2017). Interestingly, some stolen data markets provide more comprehensive product verification methods, anointing verified reviewers or testing product themselves (Lusthaus, 2012; Yip, Webber, & Shadbolt, 2013). Finally, administrators frequently assign status to sellers. Usually drawn from known metrics, sales, reputation, or average ratings, market administrators create status hierarchies, ranking some vendors as trusted, others as level 5, and so forth (Podolny, 1993). As opposed to status in a networked sense (i.e. reputation), the crucial difference is that these are centrally administrated devices that differentiate between sellers based on performance (Muniesa et al., 2007). Their administration by a third party means that the transitive properties of trust can be activated, because the trustworthiness of the administration can be conferred to the seller (Glückler & Armbrüster, 2003).

The administration of illicit online markets, particularly in cryptomarkets, is therefore a key producer of trust (Lusthaus, 2012). This trust production follows from their capacity to sanction, reward, mediate, verify, control, and authenticate (Odabaş et al., 2017a). In cryptomarkets they support primarily the production of cooperative certainty, because there are no central means of differentiating products based on quality. The formalized status hierarchy constructed by administrators may be argued to increase product certainty, but it is derived from cooperative performance (Schilke et al., 2016). In other words, administrators can ensure a

transaction is finalized and rank a seller's performance, but if the product is of low quality or under weight, their regulatory capacities are weak.

Apart from the reputation system, the effects and correlates of administrative trust production in cryptomarkets and illicit online markets are empirically under-scrutinized. Espinosa (2019); Hardy and Norgaard (2016); Przepiorka et al. (2017) and Nurmi et al. (2017) study the influence of reputation on drug prices and sales, but include neither escrow nor status in analyses. Eschenbaum and Liebert (2019) deviate, but include only escrow. Norbutas et al. (2020b) examine whether reputation increases the probability of a drug seller migrating to another cryptomarket upon closure, but does not assess authentication. Norbutas et al. (2020a) examine the choice of exchange partners, observing that in the absence of past exchanges with a seller, buyers rely on reputation to make their choices. This replicates findings by Duxbury and Haynie (2018b) who examined selection of vendors. Duxbury and Haynie (2018a) apply social network analysis to assess the robustness of cryptomarkets to disruption, but include only reputation as well. In these three studies centered around reputation neither escrow nor status are included. An exception is Décary-Hétu and Quessy-Doré (2017), who find that neither status nor reputation are predictive of a cryptomarket seller having a more loyal customer base. In studies of markets for stolen data and hacking, these are scrutinized more closely. Holt, Chua, and Smirnova (2013) and Holt, Smirnova, and Hutchings (2016) find no significant price differences between products depending on escrow status, whereas Odabaş et al. (2017a) find that verified sellers are more successful. Holt et al. (2013) further find that verified products are sold at a higher price. Finally, Décary-Hétu and Dupont (2013) find that "awards" granted by administrators are associated with a higher reputation. Empirically, the mediating and authenticating functions of administration are therefore less appreciated than the reputation system outside the stolen data economies.



### 5.1.2 Reputation and trust

As discussed in Section 4.3.2, reputation is a key concept in theories of trust (Dasgupta, 1988; Glückler & Armbrüster, 2003), and it is one of the primary pre-modern trust devices in illicit markets (Beckert & Wehinger, 2013). However, there are two fundamental differences between reputation and reputation systems as used in online markets: The transitive properties of information and trust, and the institutionalization, or formalization, of reputation.

Reputation systems seek to mimic the function of reputation, the distribution of information in social networks, through collated ratings and feedback (Resnick et al., 2000). However, because trust is transitive, transferable, there is a fundamental difference between reputation in its traditional embedded sociological sense (Granovetter, 1985; Sztompka, 1999), and its reconstruction as a socio-technical device (Muniesa et al., 2007). The transitivity of trust complicates the bet of trust, because it necessitates we "make supplementary bets of trust" (Sztompka, 1999, p. 75). That is, if trust is invested in a trustee, based on information from a friend, then one is effectively betting on the honesty of two individuals. In other words, there is a fundamental difference between a piece of feedback left by an anonymous cryptomarket user, and the word of a friend, or someone in whom one trusts (see also Misztal, 1996, p. 134). Drawing on the differentiation of Glückler and Armbrüster (2003), reputation systems promote, not networked, but public reputation, because information does not traverse a network through more or less trusted peers. Consequently, super reviewers or verified reviewers, because they are known actors operating under tangible and consistent pseudonyms, can be approached as more trustworthy (Bancroft, 2020). Alternatively, the reputation system may be approached as a centralized repository of information, similar to the *lex mercatoria*, though under more control and with less transparency (Dow, 1987). Here, information may be taken as more trustworthy, through a transference of trust invested in administrators or the institution as a whole (Sztompka, 1999, p. 75).

Whether the reputation system should be seen as a relatively transparent or

decentralized institution (Hardy & Norgaard, 2016; Przepiorka et al., 2017), or as subject to administrative governance (Odabaş et al., 2017a), is an unresolved tension in the literature on illicit online markets. As discussed in Section 3.2.2, one contingent of scholars compare reputation systems to the *lex mercatoria*, merchant courts of medieval Europe (Milgrom et al., 1990), allowing spontaneous order or order without law to emerge. This is an abstract discussion, but there is a key difference between the merchant courts and reputation systems in illicit online markets – the degree of centralized governance. In merchant courts, judges did not have the means to enforce restitution (Milgrom et al., 1990, p. 10). From the perspective of social control theory, this is a key difference because the power relations are radically different (Black, 1990). The problem is alluded to by Diekmann and Przepiorka (2019) who support the thesis, but acknowledges the existence of escrow comparing it to contract law. What is underappreciated in this position, is therefore the “considerable amount of social control and coercion [exercised to] maintain the community’s cohesion” (Dupont et al., 2016, p. 140). This power flows from a market organization subject to a high degree to centralized governance (Odabaş et al., 2017a). Law may be absent in a formal sense, it is in all illicit markets, if law can only be practiced by a state. But an exercise of social control so high in legalness cannot be ignored (J. Griffiths, 1984). If anything, there seems to be quantitatively more law in illicit online markets, especially cryptomarkets, than in most illicit markets.

The tension between reputation in its traditional sense, as information that is transmitted through networks and weighted by the trustworthiness of its transmitters (Granovetter, 1985), and the governance of reputation systems, is relatively unexplored in the scholarship on illicit online markets. However, several studies have examined the effects of reputation systems. Eschenbaum and Liebert (2019); Hardy and Norgaard (2016); Przepiorka et al. (2017) and Espinosa (2019) document that sellers with a positive reputation charge higher prices, and reduce them on receiving negative feedback. Similarly, Nurmi et al. (2017) and Przepiorka et al. (2017) show that sellers with a positive reputation tend to sell more products,

and vice versa for negative feedback. Duxbury and Haynie (2018b) and Duxbury and Haynie (2018a) apply social network analysis to a dataset of cryptomarket transactions, and find that positive reputation and accusations of fraud predict tie formation in expected directions. In a later study, Duxbury and Haynie (2020) find evidence that undermining the reputation system through "signal attacks" could deter trade. Norbutas et al. (2020a) apply discrete choice models, finding that buyers exhibit patterns predicted by learning effects, and choose sellers based on reputation when making their first purchase (Buskens & Raub, 2002). In stolen data markets, Décary-Hétu and Dupont (2013) find that awards, social ties, and time spent in a forum were predictive of a positive reputation. Similarly, Holt, Smirnova, and Hutchings (2016) find that active sellers tend to accrue more feedback. Décary-Hétu and Leppänen (2013) find that while reputation is positively associated with criminal performance, the number of opportunities for selling product, it is statistically insignificant. Holt et al. (2013) find that sellers with a positive reputation charge higher prices for stolen data.

The study of reputation systems in illicit online markets draws heavily on the cooperative approach to the study of trust (Diekmann & Przepiorka, 2019; Norbutas et al., 2020a; Przepiorka et al., 2017), and insights from experimental studies have been replicated. Specifically, Norbutas et al. (2020a) confirm parts of the control/learning effect of dyadic and network relations posited by Buskens and Raub (2002). Similarly, the well-documented profits of reputation in illicit online markets may be seen as confirmation that laboratory games do in fact reflect economic behavior outside a lab (e.g. Hardy & Norgaard, 2016; Kollock, 1994; Przepiorka et al., 2017). As such, there is a consistent literature which corresponds to Dasgupta's (1988) proposition, that reputation constitutes a capital asset: Sellers charge higher prices, sell more product, and attract a larger population of buyers. As for uncertainty, reputation systems may be argued to increase both cooperative and product certainty, because they propagate information and hold the potential for sanction. Original conceptualizations of reputation systems note their ability to establish a shadow of the future (Resnick et al., 2000), and Dimoka et al. (2012) argue it is

primarily an indicator of a seller's ability to abide by cooperative expectations.

### 5.1.3 Networks and social ties

Having argued that reputation systems are not comparable to reputation in its traditional sense, the question is then what the role of networks are for the production of trust in illicit online markets. Principally, actors may be argued to be more or less embedded in a network, not in the sense of social network analysis, but as a community (Bancroft, 2020; Masson & Bancroft, 2018). Such a structure allows norms to proliferate and institutionalize, and for trust to be extended to members (Granovetter, 2017, p. 65). The network, as a stand-in for group or community, itself may be a reason to increase expectations. In turn, this may be a stand-in for the fact that buyers know opportunists could, or would, be sanctioned should they turn out to be dishonest (Simpson & Willer, 2015). Networks are not just sequences of relational ties that allow repeat exchanges and information propagation, but also arenas of social exchange (Beckert, 2009). Cryptomarket sellers, and buyers, are embedded in such a larger network or community (Tzanetakis, 2018b), and while the degree may vary (e.g. being a one-time buyer or a seller), group-based expectations and a sense of a shared understanding of the world is conducive to trust (Zucker, 1986).

Munksgaard and Demant (2016) identify a libertarian political sentiment, a finding that is corroborated by Maddox et al. (2016); Martin (2014a, 2014b); Masson and Bancroft (2018) and Zajácz (2017) who also extend it to embedded norms of what can be expected from exchange relations. Recent work by Ladegaard (2019b) has argued that the resilience of cryptomarkets is supported by a solidaristic community ethos (see also Masson & Bancroft, 2018). By extension, scholars frequently invoke notions of community (e.g. Bancroft & Reid, 2016; Lorenzo-Dus & Di Cristofaro, 2018; Maddox et al., 2016; Rolando & Beccaria, 2018). Finally, qualitative research has shown that buyers tend to harbor general ideas and expectations of cryptomarkets and their sellers, and vice versa (Martin et al., 2020; Van Hout & Bingham, 2013, 2014). Thus, group identity or belonging may be as-

sociated with certain values, just as in traditional drug markets (e.g. Adler, 1993; Jacques & Wright, 2015; Scott et al., 2017). However, while broadly recognized in the literature, these sources of trust are difficult to measure empirically beyond qualitative research (Bakken et al., 2018; Dupont et al., 2016; Moeller et al., 2017; Tzanetakis, 2018b; Zucker, 1986). Hardly can one control for the belief in norms of illicit online markets, but the existence of a shared group identity and a community may increase both product and cooperative certainty. For example, Holt, Smirnova, and Hutchings (2016) find that Russian sellers charge higher prices in a stolen data market, which may suggest they are conceived of as more trustworthy.

A network, and a market, also consists of exchanges, dyadic relations that are either sporadic, frequent, or one-off. These provide the means of learning about the performance and quality of the exchange partner, learning effects, and if exchanges are recurrent the oppositional relation inherent in the prisoner's dilemma becomes cooperative (Buskens & Raub, 2002). In other words, Akerlof's market for lemons drastically changes structure if games are repeated because incentives for opportunism are reduced. The dyad is more conducive to the production of trust because it allows for direct learning and control effects in an authentic manner, and because every exchange holds the potential of being only the first (Buskens & Raub, 2002; Buskens & Weesie, 2000; Möllering, 2005b). However, structurally, the institutional stability of cryptomarkets (Martin et al., 2019), in which identities and reputation are "brought along" as markets close down also produces an incentive to think in repeated, rather than one-off, games (Ladegaard, 2020; Norbutas et al., 2020b). Thus, it is not only the game played, but also the structure around future games, that may produce trust. The concrete exchange dyad may reduce uncertainty across both axes, because exchange allows the reduction of uncertainty in the most tangible and authentic way; the arrival of a letter stuffed with pills, and the consumption thereof.

Repeated exchanges are observed as trust producing by several scholars, though limitations on data collection has significantly limited the scope of research. Décary-Hétu and Quessy-Doré (2017) observe that 60% of customers make repeat pur-

chases, corroborated by Norbutas et al. (2020a) who find return buyers remain loyal to vendors. Finally, Duxbury and Haynie (2018a, 2018b) and Norbutas (2018) document such exchange patterns do exist, though it seems most buyers purchase only once. The presence of returning customers thus changes the incentive structure on a structural level, and repeated exchanges and "loyalty" to sellers are observed. The former is conducive to trustworthy behavior, while the latter suggests the dyad produces trust.

## 5.2 Passive and active sources of trust

In the preceding sections I have highlighted general sources of trust identified in the scholarship on illicit online markets, and briefly discussed them in the light of the preceding chapters. I stressed how these mechanisms overlap and intersect, for example that group-based expectations may derive from the knowledge that members are subject to control (Granovetter, 2017, p. 66). The notion of a backdrop or background is instructive for differentiating the production of trust (Granovetter, 2017; Zucker, 1986), and it becomes apparent that several of the mechanisms highlighted as trust producing may function as such a backdrop: The presence of sanctions, the existence of a de facto system of courts and contracts, a stable social structure, and the expectations, and trust, that may be extended exclusively based on group membership (Bancroft et al., 2020). Yet, at the same time there are active trust producing components, for example, escrow, which reduces cooperative uncertainty (Moeller et al., 2017), or product verification (Odabaş et al., 2017a). Others, are both active and passive, the reputation system for example. One may use it for comparison of sellers, but one may also operate under the assumption that a dishonest seller would have been sanctioned by others. That is, the reputation system may be used actively, or one may just operate under the assumption that it enforces conduct.

I therefore suggest a practical separation of active and passive sources of trust, drawing particularly on Zucker's (1986) identification of a trust production in-

dustry. The former consists of actively changing variables which can inform the cognitive process, reputation scores, status positions, escrow, whereas the latter supports a more vague sense of what the future holds. Put alternatively, a delineation between calculation and assumption (Luhmann, 1979). I denote the latter as a passive source of trust, because it refers to a stable social structure, the market institution (Ladegaard, 2020; Martin et al., 2019). One may make assumptions about this order, and an actor may be more or less invested in them. This investment occurs through social integration, as discussed in Section 4.3, habit, following norms, routine, et cetera which internalizes what would otherwise need calculation (Luhmann, 1979). Derived from an ethnomethodological and Bourdieusian perspective on habits, routines, and intersubjective understandings of the social world, this backdrop is not easily quantified and measured, nor separated as clearly as the active trust producing components (Misztal, 1996; Zucker, 1986). However, with some caution it is possible to suggest how separable parts of the backdrop would contribute to the production of trust by reducing uncertainty.

Below I suggest four assumptions, each summarized in a sentence, that a buyer may make based on the preceding discussion. Creating a rigid schema for them is problematic, but spelling some reasonable assumptions out is a useful analytic tool. These, and other assumptions, may influence the cognitive estimate of the trustworthiness of a seller. Reasoning may be conscious, or it may be unconscious, and the buyer may be little or very invested in it (Granovetter, 2017; Zucker, 1986). More appropriately, this should therefore be seen as a continuum of more or less conscious beliefs that would undergird any other routine activity that involves trust in an abstract system (Luhmann, 1979). Thus, another way to frame this notion of passive sources of trust, or a backdrop, is to consider how much a buyer would agree to these sentiments if, for example, they were asked in a survey; "On a scale of 1 to 10, do you believe cryptomarket sellers that are dishonest are competently removed by administrators?"

1. **Group- and membership based expectation:** One may put trust in a vendor based on being part of a class, assuming they act according to similar

norms (Zucker, 1986).

2. **Existence of centralized governance:** One may put trust in a vendor assuming that the administration would have kept an untrustworthy vendor out or sanctioned them long ago (Odabaş et al., 2017a).
3. **Existence of decentralized sanction:** One may put trust in a vendor because others would have sanctioned them informally through the reputation system (Ellickson, 1991; Hardy & Norgaard, 2016; Przepiorka et al., 2017).
4. **Stable social structure:** One may put trust in a vendor, under the assumption that it is in their long term interest to act honestly (Ladegaard, 2020; Norbutas et al., 2020b).

Group-based expectations are analogous to those extended to kin, subcultures, and ethnic groups in illicit markets generally (Adler, 1993; Sandberg, 2012; Scott et al., 2017). In the context of cryptomarkets, however, these may be argued to be more easily demarcated. For example, Adler (1993) describes degrees of belonging to each other's social worlds in a community of upper-level dealers and smugglers, an "umwelt" (p. 63). In the setting of an illicit online market these boundaries are more material; membership and payment of a bond. Membership is indicative of some commitment to acting honestly, having paid a bond, but involves no verification of product. However, buyers in qualitative research have discussed cryptomarket sellers, and the institution itself, in general terms concerning quality (Barratt, Lenton, et al., 2016; Van Hout & Bingham, 2014). Consequently, I suggest group-based expectations may increase certainty in both directions. Conversely, I suggest that the existence of centralized governance and the reputation system predominantly reduces cooperative certainty, because their primary function is to sanction dishonest behavior, opportunism (Dimoka et al., 2012; Odabaş et al., 2017a; Przepiorka et al., 2017). The reputation system can increase product certainty some, as a buyer may sanction a seller for providing poor product, and thus a weak increase is suggested. Finally, the existence of a stable social structure



is suggested to increase certainty in both directions because the incentive structure that encourages iterated games is changed (Ladegaard, 2020; Przepiorka et al., 2017). As discussed in Section 4.3.2, stable exchange structures change incentives from one-off games to cooperative endeavors (see also Fanselow, 1990; Geertz, 1978). Consequently, a buyer may assume that a seller conceives of the exchange as one of many potential future ones, with the buyer or with other buyers (Simpson & Willer, 2015).

The point of highlighting reasonable expectations that may be drawn from social structure is that it illuminates on the extent to which the cryptomarket can reduce uncertainty in a passive manner, specifically by internalizing expectations and routinizing exchange (Misztal, 1996; Zucker, 1986). When dissecting these components, it appears that the cryptomarket, and illicit online markets generally, are more conducive to cooperative, rather than product, certainty. If anything, the production of product certainty is a secondary effect. However, it is evident that social structure may itself appear trustworthy, or be worthy of trust, particularly as one grows familiar with it (Luhmann, 1979).

The same approach can be taken to analyzing the active sources of trust, though these are more easily delineated, and can be schematized as shown in Table 5.I. As opposed to the passive sources of trust, these are actively implemented and I use term active trust production to reflect that it is no longer an internal resource that is discussed, but an active social process of building expectations and reducing uncertainty. The suggested effects are strictly relational, and the estimate of each is based on how well the literature suggests it would compare to escrow and product verification, the two mechanisms that appear the most conducive to the reduction of uncertainty. None designates no change, low barely any increase, medium some more, and high as equivalent or better than verification and escrow.

Status and reputation, while slightly different, are primarily vehicles for the reduction of cooperative uncertainty (Dimoka et al., 2012). A good reputation or status is a track record, indicative that a seller has gone unsanctioned and acted honestly thus far, and is likely to perform as such in the future (Milgrom

Mechanism	Product certainty	Seller certainty
Escrow	None	High
Status hierarchy	Low	Medium
Reputation system	Low	Medium
Product verification	High	None
Exchange	High	High

**Table 5.I** – Active trust production and uncertainty reduction.

1. **Escrow:** The reduction of cooperative uncertainty through a contract (Diekmann & Przepiorka, 2019; Moeller et al., 2017).
2. **Status hierarchies:** The ranking of sellers according to status by the administration (Podolny, 1994; Tzanetakis, 2018b).
3. **Reputation systems:** The ability to learn about past conduct through the reputation system (Milgrom et al., 1990; Przepiorka et al., 2017).
4. **Product verification:** Centrally administrated verification that reduces product uncertainty (Dimoka et al., 2012; Fanselow, 1990).
5. **Exchange:** Accumulation of information and experience through repeatedly exchanging with a seller (Buskens & Raub, 2002; Möllering, 2005a; Norbutas et al., 2020a).

et al., 1990). Though this arguably cannot happen without providing a product that is adequate within some interval, the reduction of product certainty is only secondary, because both are derived from performance (Bakken et al., 2018; Tzanetakis, 2018b). This is captured in the fact that ratings are almost exclusively positive, and one rating typically collapses product and seller (Espinosa, 2019; Hardy & Norgaard, 2016; Przepiorka et al., 2017). Cooperative uncertainty is most profoundly reduced through escrow, because the seller will be comparatively more restricted in their opportunism within escrow (Moeller et al., 2017). Verification processes for products, not provided by administrators of cryptomarkets but available in some illicit online markets, are included for illustrative purposes and support product certainty (Yip, Webber, & Shadbolt, 2013). In both cases, these are active measures; a seller offering payment in escrow, or submitting product for verification. Finally, exchange, one-off or iterated, provides the most robust reduction of uncertainty (Möllering, 2005b). Here, seller performance and product authenticity remain undiluted by the transitivity of trust and the reductive transmission of information through status or reputation. Instead, a pure, unadulterated affirmation of the bet is delivered (Möllering, 2005a). This explains the strong tendency towards repeated exchanges and loyalty observed in the literature on cryptomarkets (Décary-Héту & Quessy-Doré, 2017; Duxbury & Haynie, 2018a, 2018b; Norbutas et al., 2020a).

Through this analysis of trust in illicit online markets, it becomes apparent that the production of trust cannot be reduced to a single mechanism, such as the reputation system or administrative governance (Granovetter, 2017, p. 59). To do so would necessitate discarding an extensive body of theory and empirical research, most pressingly the backdrop of trust or trust as a passive resource. It is possible to identify factors that should be actively producing trust (Zucker, 1986), and these may be analyzed. It also becomes evident that the cryptomarket institution predominantly supports the active reduction of cooperative uncertainty, particularly when compared to stolen data markets. At best, institutional features, reputation systems, and status hierarchies promote product certainty only

as a secondary function. Arguably, the most forceful mechanism that can support product certainty is the most primitive mode of trust production – **exchange**. In other words, the modernization of the premodern trust devices of illicit markets I proposed is still incomplete, leaving relatively little certainty about product as opposed to cooperation (see also Ladegaard, 2020).

The point of departure for an analysis of trust should be to recognize that it cannot be reduced to a single variable or source of trust (Granovetter, 2017, p. 59). Rather, the production of trust is a complex social process in which structure and agency are intertwined (Möllering, 2005b). Thus, I suggest that the analysis of trust should depart from the assumption that the production of trust in cryptomarkets is an active social process against an institutional backdrop of trust in which one may be more or less invested. Here, different mechanisms, actions, and choices can reduce or increase uncertainty through a process of active trust production. Acknowledging the complexity of how trust is produced inevitably reduces the forcefulness of theoretical claims, but in turn they gain validity (Lewis & Weigert, 1985). Nevertheless, it also opens up new avenues of research in the study of illicit online markets and cryptomarkets, beyond the inclusion of a few extra variables.

### **5.3 Experience as the central causal process**

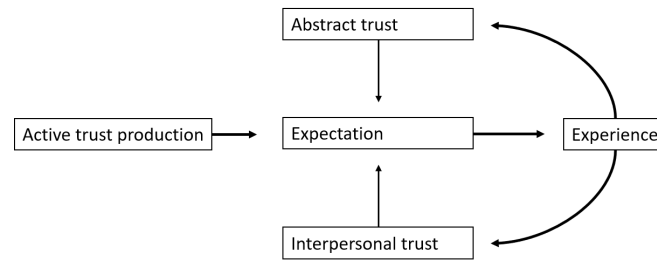
Trust is not a static attitude or disposition, social or psychological, but involves a cognitive process (Lewis & Weigert, 1985). This is either an explicit or implicit assumption of the theories discussed in the preceding chapter. I posit that this process of experiencing and processing is crucial to the development of trust within the context of illicit online markets. In this section, I stress experience, rendered operational as exchange, as the central causal mechanism in the production of trust. The importance of experience follows from observations developed in the preceding chapters.

First, as discussed in Chapter 2, illicit markets are traditionally socially embedded, and repeated exchanges are one of the primary means of producing trust

(Adler, 1993; Moeller, 2018a). Furthermore, there is an extensive economic sociological literature supporting the importance of experience as a producer of trust in uncertain circumstances (e.g. Buskens & Raub, 2002; Glückler & Armbrüster, 2003; Granovetter, 1985; Schilke et al., 2016). Second, choosing to use a cryptomarket, or any other illicit online market, currently involves either **a)** switching social arena of exchange online (e.g., switching from social supply to a cryptomarket), or **b)** entering a social arena for the distribution of an illicit good for the first time. In either case, social ties to sellers are non-existent, and the backdrop is not fully internalized, since it is developed as an active process (Zucker, 1986). From this, it follows that the bet of trust has the potential to radically alter the potentiality of future action by producing trust (Möllering, 2005b).

Hardin (1993) suggests that trust at the individual level is a "commonsense Bayesianism" (p. 526); an iterative process of acquiring experience, updating beliefs, and revising the subjective estimate of the target's trustworthiness. While this notion is inclined towards rationality (Möllering, 2005b), there is no reason why such a process should be restricted to rational calculation. In fact, social integration, taken for grantedness of prosocial behavior, and the subconscious coming together of worlds, are specifically built through routine, habit, and social interaction (Misztal, 1996; Zucker, 1986). Thus, expectation is built through experience, whether one holds the position that trust is grounded in emotion, rationality, or both (Lewis & Weigert, 1985). In figure 5.1 the proposed process is specified. It contains a simple underlying narrative: The entrant enters the social arena of exchange. They encounter unfamiliar surroundings, and have no concrete experience. They must therefore rely on active trust production, contracts, reputation scores, and status, to generate expectations. The exchange event, however, yields a concrete payoff; experience. Experience informs the cognitive base of trust, building both expectations towards the abstract system and the concrete other – cryptomarket and seller. The buyer's expectations, or priors, are now updated towards the seller and the institution.

The novice buyer, the entrant, who encounters an illicit online market has yet



**Figure 5.1** – Conceptual model of how experience informs backdrop and interpersonal trust.

to embed themselves within the social arena of exchange (Beckert, 2003). That is, in comparison to the Simmelian notion of trust in money, what Luhmann (1979) argues is a trust that is so fundamental that it becomes almost a familiarity, the entrant enters an unfamiliar arena and their expectations rest on a shaky foundation. Zucker (1986) highlights how the institutional production of trust is an ongoing process of not only creating regulatory mechanisms, courts, contracts, and so forth, but also creating constitutive expectations and background expectations. Misztal (1996) brings forth a similar point in the discussion of trust as habitus, highlighting how memory, habits, and reputation<sup>1</sup>, are ways of building "a general sense to trust towards the social world" (p. 156). That is, experience builds worlds in common (Möllering, 2005b). This reasoning thus suggests a similar process as the experiential position in the study of trust at a macro-scale; trust as an evolving disposition, subject to input and experience (e.g. Sønderkov & Dinesen, 2016; Uslaner, 2008; Wu, 2020).

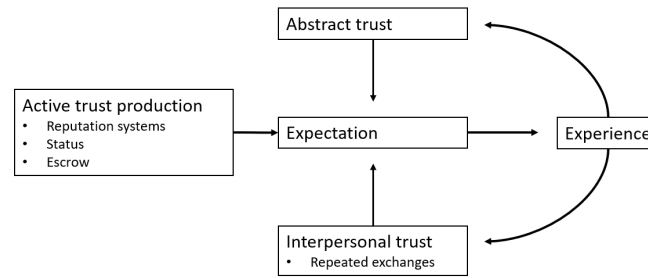
Sztompka (1999) uses a notion of concentric circles of trust that radiate from the near and close towards abstract others, social institutions, politicians, courts, and so forth (p. 41-43). Misztal (1996) makes a similar distinction, and Luhmann (1979) talks of systems trust. Sztompka's concept is more applicable here, because the target is not at the micro-scale within a market context, and it builds on the notion of a radius of trust which is more empirically applicable (Carlsson

<sup>1</sup>Misztal's (1996) concept of reputation is more complex than the aspects of reputation discussed earlier, but refers to the differentiation between trustworthy and untrustworthy individuals and is specifically related to group membership (p. 120).

et al., 2018; Delhey et al., 2011). Consequently, I use the term "abstract trust", or "abstract other", from hereon, to properly specify that we are moving from the vague territory of habits, routines, and familiarity, towards a measurable quantity; trust beyond the dyad, towards the social arena of exchange and its sellers.

From the perspective of social embeddedness, specifically, the learning effect (Buskens & Raub, 2002), and the transitivity of trust (Sztompka, 1999), experience is also central. Buskens and Raub (2002) defines the learning effect as "the possibility for actors to improve their choices in given interactions using experiences from past interactions" (p. 170). That is, the accumulation of information informs future choice, a hypothesis which explains the presence of return buyers in cryptomarkets (Décary-Hétu & Quessy-Doré, 2017; Norbutas et al., 2020a). Similarly, Zucker (1986) and Schilke et al. (2016) stress experience-based trust, highlighting the value of personally acquired experience over reputation (see also Glückler & Armbrüster, 2003). In this sense, the accumulation of more accurate information through experience simply provides a better basis for calculating the future, because its transmission is unadulterated by others, and trusting one's own experience necessitates no secondary bets on the trustworthiness of a third party (Sztompka, 1999, p. 75). This type of trust, that is directed at a concrete other, we may call interpersonal trust (Sztompka, 1999, p. 41).

It is possible to consider this as a purely calculative production of trust, consisting of the accumulation of information that adjusts the subjective probability assigned to the future actions of others (Coleman, 1994; Hardin, 1993), but this seems unsatisfactory considering the emotional and physical investment in the exchange (Möllering, 2005b, 2017). The consumption of a drug is not the consumption of an objectively measurable good, rather, its value is socially produced either individually, through price, or community (Bancroft & Reid, 2016; Ben Lakhdar, 2009; Bilgrei, 2018). In other words, there is a degree of authenticity to making a successful bet of trust, particularly in the case of drugs – the high itself confirms the bet of trust, not merely the package. In this sense, the information acquired through interaction is not only of high quality, it also has an authentic and embod-



**Figure 5.2** – Conceptual model of how experience informs backdrop and interpersonal trust.

ied component that will compound its effect.

### Producing trust

The model I have proposed does not necessitate reformulating past research, but is capable of integrating it. Figure 5.2 adds the key variables from past research and the preceding discussion into the experience-model to illustrate this. The buyer’s subjective estimate of the future, trust, is informed by three sources: Active trust production, abstract trust, and interpersonal trust. The model posits that the cryptomarket institution produces trust through a set of active mechanisms; reputation systems, status, and escrow. These are continuously changing variables allowing buyers to rank and differentiate sellers. A buyer can attain experience through exchange, which I suggest is the central causal process that produces trust. The centrality of attaining experience is compatible with both the sociological notion of trust as social integration (Misztal, 1996; Sztompka, 1999; Zucker, 1986), and more rationally inclined conceptualizations of trust that stress the acquisition of information (Buskens & Raub, 2002; Hardin, 1993). Experience yields, in this formulation, abstract and general trust aimed at the institution and its members, and interpersonal trust directed at specific individuals.

Within the model, expectation forms experience. That is, the assumption is that social action is rendered possible, and constrained, by the level of expectation in the other (i.e. an estimate of trustworthiness). The estimate is based on two



sources; active trust production and experience. Experience is dual, and generates both interpersonal and abstract trust. This model creates two classes of buyers: Those who have experience, and those who have none. From this it follows that:

1. First-time buyers will make decisions based on the available sources of trust. Absent past experience they will rely on active trust production.
2. Returning buyers will make decisions based on available sources of trust. These will include abstract and interpersonal experience, in addition to active trust production.

Norbutas et al. (2020a) show that buyers choose products from sellers with a positive reputation, but that the effect is weaker for returning buyers, who in turn choose sellers they have already traded with. Duxbury and Haynie (2018a) find similar patterns using social network analysis, observing that buyers exhibit "preferential attachment" to sellers with a high reputation, and that buyers exhibit different preferences in selection after a transaction. Both studies thus show that new buyers, entrants, choose high-reputation sellers, whereas returning buyers seem to choose based on past experience as well. These findings therefore conform to the suggested causal process, because the value of reputation weakens on attaining concrete experience with a seller.

Status, escrow, and reputation systems, of which only the latter has been exhaustively examined in cryptomarkets (Espinosa, 2019; Hardy & Norgaard, 2016; Przepiorka et al., 2017), are the central components of active trust production. These are at the disposal of any buyer, including the first time buyer. The reputation literature has documented that sellers with higher reputation scores both charge higher prices and make more sales (Eschenbaum & Liebert, 2019; Espinosa, 2019; Hardy & Norgaard, 2016; Przepiorka et al., 2017). The underlying reasoning is that these sellers can do so because they are more trustworthy, which provides support for the active trust production component.

Thus, the model is capable of integrating past research, namely the observation that the effects of reputation vary (Duxbury & Haynie, 2018a; Norbutas et al.,

2020a), by assuming that trust is a Bayesian cognitive process (Hardin, 1993). First-time buyers and returning ones operate on different sources of trust, and thus their expectations differ. Put simply, a reputation score is more informative the first time you buy from a drug dealer. However, the model also highlights aspects that are less scrutinized. The abstract dimension of trust, that experience produces abstract trust, has only been addressed in qualitative research in which buyers describe a level of trust in the institution in general terms (Barratt, Lenton, et al., 2016; Van Hout & Bingham, 2013). However, the causal process I have outlined conforms to these studies; buyers express institutional trust.

For the cryptomarket buyer, I suggest that this is the central causal process that builds trust in the cryptomarket institution and in the seller. Whether one considers expectation as habitus rooted in memory, habit, and routine (Misztal, 1996); a rationally grounded estimate (Coleman, 1994; Hardin, 1993); or as driven primarily by experience (Buskens & Raub, 2002; Granovetter, 1985), the notion of experience can subsume each: Experience is authentic, undiluted, and informative. Each experience holds the potential for future courses of risky, but less uncertain, action through an ongoing process of social integration. And fortuitously, experience is an empirical event.

### 5.3.1 The problem of reputation

In the preceding chapters, I have suggested a tension between the cooperative tendency in the study of illicit online markets, the scholarship on reputation systems, and the position of criminologists. Here, the Hobbesian question may be argued to haunt the literature. As Hardy and Norgaard (2016) and Przepiorka et al. (2017) invoke concepts like "spontaneous order" and "order without law", they appear in direct contradiction to the criminological position outlined in Chapter 3. Hardy and Norgaard (2016), for example, argues that cryptomarkets are "an empirical example of the depth of robustness of spontaneous order", and that "[it] shows that the principles of an unfettered market rooted in reputation and accountability can be applied to an extremely vast array of goods and services" (p.

517). Similarly, Przepiorka et al. (2017) argue that "[if] we find reputation effects even in the absence of legal and social conditions that deter opportunistic actors and promote trust, this would strongly reinforce the idea that reputation systems enable the bottom-up emergence of cooperation in large groups of self-regarding actors" (p. 754). Eschenbaum and Liebert (2019) are more moderate, acknowledging that an administrator both controls the escrow system and platform. Yet, they still conclude that all "legal institutions are replaced by reputation via a centralized platform mechanism to enable trade" (p. 3). Thus, the existence of cryptomarkets is to be seen as empirical proof that self-regarding actors can sustain cooperative endeavors without the involvement of a state through informal institutions (Milgrom et al., 1990). Historically, this may be argued to fall within what Misztal (1996) calls the utilitarian perspective on social order, which persists in rational choice theory. Here, "[social] equilibrium is achieved by the concurrent choices of self-seeking, calculating individuals" (p. 33).

The suggestion that cryptomarkets are analogous to the *lex mercatoria*, institute spontaneous order, or order without law, appears, at the least, problematic when *de facto* courts and contracts, and unprecedented proto-state social control, are operational – regardless of illegality (Diekmann & Przepiorka, 2019; Odabaş et al., 2017a). This has remained the sentiment among criminologists, who have noted the distribution of power, and the extensive governance exercised by administrators (Dupont et al., 2016; Lusthaus, 2012, 2013; Moeller et al., 2017). This line of reasoning is epitomized by Odabaş et al. (2017a) who relegates reputation systems to only a secondary informal source of governance in illicit online markets. Practically, simpler forms of non-state law, institutionalized manifestations of informal social control, the Mafia and insurgent political groups for example, regularly exercise significant social control in illicit markets (Gutiérrez D. & Thomson, 2020; Reuter, 1984). In this sense, the administrators of large illicit online markets operate in a simple proto-state fashion, offering a relatively totalitarian social contract in exchange for rent.

As these two tendencies are excavated, self-interest or social power as consti-

tutive of social order and cooperation, the Hobbesian question returns (Wrong, 1961). Put bluntly, one position contends that power and control stabilize the arena of exchange, whereas the other argues that absent coercive force self-interest creates spontaneous social order. This tension between an undersocialized and oversocialized conception of social action (Wrong, 1961), as driven by internal or external forces (Simpson & Willer, 2015), was the problem that compelled Granovetter (1985) in his seminal article. My contention is that the consequence of this latent tension within the literature is the comparatively weak attention given to the productive power of administration in empirical research, as discussed in Section 5.1. The solution, however, is not to go from an undersocialized conception of social order arising from self-interest into the opposite camp, solving the problem as Hobbes did by reference to absolute power, and neither is that the position within the criminological literature (e.g. Dupont et al., 2016; Odabaş et al., 2017b). Thus, rather than assuming trust is produced by reputation systems or the administration, the model I suggested in Section 5.3 seeks to walk this fine line, by departing from the social embeddedness of economic action, and by implication, trust (Granovetter, 1985).

Whether approached from the macro perspective of generalized- and institutional trust, or the cooperative perspective, there is agreement in the literature that experience, whether the accumulation of information or the melting together of social worlds, is a crucial process in the production of trust (Hardin, 1993; Zucker, 1986). Arguably, even more so when products are uncertain and formal control is absent (Dimaggio & Louch, 1998; Glückler & Armbrüster, 2003; Moeller & Sandberg, 2019). In this sense, trust is both socially embedded in network and structure, but it is also a disposition that is created within and supported by them (Simpson & Willer, 2015). To approach trust as produced by both structure and agency, a Bayesian process of acquisition and adjustment, is promising because it does not presuppose that action is overdetermined by structure, nor that it is disembedded from it. In other words, I suggest that the conceptual model I have proposed evades the fallacy of over- or undersocialization, because disposition and

action are seen as socially embedded (Granovetter, 1985; Swedberg & Granovetter, 1992). The model does not assume a static capacity of power, or reputation, to produce trust, these are only actively trust producing mechanisms. Instead, it is through experience that I propose abstract and interpersonal trust is built. The resolution I propose is therefore simple: The cryptomarket institution provides the arena, contracts, courts, and so forth, but it is through social integration that these become more than controls, and trust can flourish, both in the direction of abstract and concrete others.

#### 5.4 Research agenda

In the preceding sections I have presented an account of trust production in illicit online markets that is sensitive to the complex social processes that support exchange, yet apprehensive to reductionism. I argued that these markets actively and passively promote trust, suggesting a difference in whether trust was actively sought produced through escrow, status hierarchies, and reputation systems, or whether it was a set of reasonable background expectations that buyers may internalize or hold. I then highlighted the theoretical and empirical relevance of experience, rendered operational as exchange, because the buyer is positioned as an entrant in this social arena of exchange. These components address trust from the structural and agential perspective, and the question that concluded the last chapter may now be rephrased as such:

**What are the active trust producing mechanisms that reduce uncertainty in illicit online markets, and what is the role of experience in producing interpersonal and abstract trust?**

This is the overarching question that will guide the remainder of this work, and it is derived from the conceptual model, Figure 5.1. First, I set out to examine the active production of trust, addressing a research gap left by the emphasis on reputation systems. Hereafter, I turn towards experience, focusing on its role in

two concrete outcomes, abstract and interpersonal trust; cooperation and general expectations. In the former, I address the concrete benefits at the dyadic level, whereas in the latter I address the trust directed at abstract targets, the cryptomarket as an institution. Simultaneously, these questions seek to address the research gaps I have presented in the preceding sections; the singular focus on cooperation as a proxy of trust, and the empirical and theoretical emphasis on reputation as the primary producer of trust.

#### 5.4.1 Strategic measurements

Measuring the totality of trust, if one deploys an integrated view on trust, is infeasible, because neither cooperation nor beliefs can capture the complexity of this social phenomenon (Lewis & Weigert, 1985). Neither does it seem preferable, since trust is involved in a range of social actions and context, and research questions differ. Practically speaking, it seems more relevant to survey trust in politicians, than to play trust games with them. On the other hand, a trust game among politicians is likely more enlightening than surveying them about their beliefs in the trustworthiness of their neighbors. A more fruitful approach is therefore to accept the limits of measurement and acknowledge that trust cannot be fully captured through neither belief nor cooperation. From this perspective, we can apply measurements strategically, rather than categorically, and appreciate a burgeoning literature, while remaining conscious of its individual weaknesses and strengths.

Our purpose is to examine trust, its active production, and the role of experience in producing abstract and interpersonal trust. Mechanisms and processes have different intents and functions, reduction of distinct uncertainties (Dimoka et al., 2012; Schilke et al., 2016). They are thus better evaluated in light of their primary or key functions, rather than through categorical outcomes, namely belief and cooperation (Lewis & Weigert, 1985; Sztompka, 1999). Put simply, to assess the production of trust we should examine what are reasonable proxies or expressions thereof, rather than categorical outcomes. I utilize three: Price, risk-taking, and beliefs. These three are reasonable and appropriate measurements to examine the

central components of Figure 5.1, active trust production, interpersonal trust, and abstract trust. The forthcoming three articles each examine one. In the following sections I outline their strategic relevance practically, empirically, and theoretically, and situate them in the literature. In the interest of transparency, I specify the anticipated effects according to the framework I have set out.

### **Valuation and price**

Valuation, from the perspective of economics and economic sociology, is intrinsically tied to the social processes of uncertainty reduction (Beckert, 2011): Uncertain products must be priced lower (Akerlof, 1970), rendering contracts, status, governance, and reputation – the active production of trust – crucial in the formation of prices (Beckert & Wehinger, 2013; Moeller, 2018a; Williamson, 1981). Thus, price setting is a strategic measurement for analyzing the active production of trust, because a clear causal direction is implied: Certainty will allow sellers to increase price. Thus, if the hypothesized elements of active trust production function, they should allow sellers to increase price as such:

1. Products offered in escrow will be priced higher because contracts increases cooperative certainty (Beckert & Wehinger, 2013).
2. Status hierarchies will allow sellers with a verified and proven track record to increase prices because uncertainty, primarily cooperative, is reduced (Akerlof, 1970; Podolny, 1993).
3. Reputation systems will allow sellers to increase price because uncertainty, primarily cooperative, is similarly reduced (Hardy & Norgaard, 2016; Przepiorka et al., 2017).

The study revolves around the question of how sellers set the price of their goods, valuation, as uncertainty about their product and performance changes. It therefore provides an insight into how uncertainty reducing social processes, active trust production, support price formation. As an extension of the literature, the question

addresses an existing debate associated with primarily the reputation position, which has argued that reputation allows sellers to increase price (Červený & van Ours, 2019; Espinosa, 2019; Hardy & Norgaard, 2016; Przepiorka et al., 2017). The principal contribution is therefore the inclusion of active trust production, specifically escrow and status, in the analysis of how goods are valued by sellers. The study therefore examines the production of trust from an economic angle, as the capacity and tendency to charge a higher price for product which is more certain (Akerlof, 1970; Beckert & Wehinger, 2013).

### **Experience and cooperation**

As discussed previously, the study of cooperation represents a behavioral tendency within the scholarship on trust (Lewis & Weigert, 1985), and is particularly central to criminological research (von Lampe & Johansen, 2004). Within the economic sociological tradition, repeated exchanges are seen as conducive to trust based on experience, learning, control, and process (Buskens & Raub, 2002; Glückler & Armbrüster, 2003; Zucker, 1986), and the embedding of exchange in close-knit relations is a functional response to the uncertainty of illicit exchange within economic approaches (Moeller, 2018a; Reuter, 1984). Only recently has the scholarship on illicit online exchange taken to examining repeated exchanges as conducive to trust (Décary-Hétu & Quessy-Doré, 2017; Norbutas et al., 2020a), and I follow this tendency by examining how risk-taking, transaction value, is associated with active trust production and experience. Unlike these studies I focus on risk above choice, and take active trust production, beyond the reputation system, into account, including both escrow and status (Décary-Hétu & Quessy-Doré, 2017; Norbutas et al., 2020a).

Specifically, I draw on the reasoning of the investment game and consider the value of a transaction as an investment. The investment is a proxy for interpersonal trust, shown in Figure 5.1, how much one is willing to entrust the other, interpersonal trust in a market setting (N. D. Johnson & Mislin, 2011; Masuda & Nakamura, 2012; McEvily et al., 2012; Simpson & Eriksson, 2009). In other words,



the potentiality of social action increases as trust develops (Luhmann, 1979). By examining cooperation at the individual level, it is possible to include both the active trust production and experience under the following expected directions:

1. Risk-taking is discouraged by an absence of contracts (escrow) reducing cooperative certainty (Moeller et al., 2017; Williamson, 1981).
2. Risk-taking is encouraged by positive standing in reputation systems, because cooperative and product uncertainty is reduced (Dimoka et al., 2012; Przepiorka et al., 2017).
3. Risk-taking is encouraged by positive standing in status hierarchies, because cooperative and product uncertainty is reduced (Podolny, 1993).
4. Risk-taking is strongly encouraged by repeated exchanges, because product and cooperative uncertainty are reduced to an unprecedented degree (Buskens & Raub, 2002).

The design of this study thus draws heavily on the logic and reasoning of cooperative and behavioral approaches to the study of trust, discussed in Section 4.4. This is the general approach to trust among criminologists, who emphasize cooperative behavior and collaborative ventures (e.g. Gambetta, 1988b). Here, risk is seen as a measurable proxy of trust, and cooperation as the concrete manifestation thereof (von Lampe & Johansen, 2004).

### **Beliefs and products**

Moving beyond active trust production, the third measurement draws on the macro-approach to trust, in which trust is studied as a disposition or belief produced through social integration and institutional performance (Hakhverdian & Mayne, 2012; Sztompka, 1999; Uslaner, 2008). It follows from Figure 5.1, by addressing how and whether experience informs abstract trust, trust beyond the dyad. Fundamentally, the reasoning follows from that of process- or experience-based trust

(Glückler & Armbrüster, 2003; Granovetter, 2017; Zucker, 1986), or the learning effects conceived by Buskens and Raub (2002), but it is generalized: On experiencing the system or institution, beliefs are not only updated towards the concrete other, but also the abstract other – the cryptomarket (Carlsson et al., 2018). Put alternatively, through a process of social integration, the buyer comes to extend trust, not only to the seller, but towards the institution (Zucker, 1986). Thus, uncertainty should be reduced on the accumulation of experience. I further suggest that beliefs are likely to be positive, drawing on an extensive body of literature that has argued that cryptomarkets perform superior to offline drug sourcing (Aldridge et al., 2018b; Barratt, Lenton, et al., 2016; Martin, 2014a, 2014b; Martin et al., 2019). Thus, the hypothesized directions are as such:

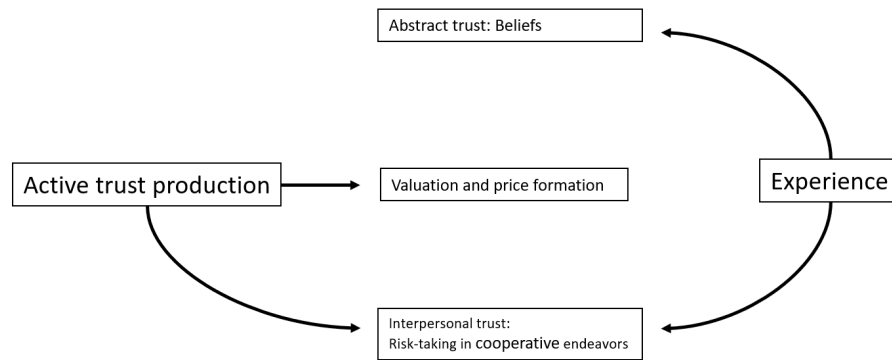
1. Uncertainty is reduced following experience with the institution (Dawson, 2019; Sønderskov & Dinesen, 2016).
2. Beliefs will follow a positive direction, because qualitative research suggests superior performance, and cryptomarket sellers constitute a particular and limited group against which expectations can be projected (von Lampe & Johansen, 2004).

Using survey data, I test whether expectations of institutional performance grow firm and positive following the use of a cryptomarket. By emphasizing beliefs as the outcome, rather than cooperation, what is specifically addressed by this study is backdrop attitudes, systems trust, or institutional trust (Sztompka, 1999, chapter chapter 6). Thus, cognition, above behavior, is addressed, but it is treated as a function thereof. The study therefore follows the sociological tendency that emphasizes beliefs as a measurement of trust, and draws specifically on experiential approaches to the production of abstract trust (Dawson, 2019; Sønderskov & Dinesen, 2016; Sztompka, 1999).

## 5.5 Summary

In this chapter I have synthesized the previous chapters and proposed a model of trust production in illicit online markets. I began by discussing the production of trust, drawing on the preceding chapters and the existing literature. Following from this, I proposed a separation between passive sources of trust and the active production thereof. The former consists of a stable social structure on which assumptions may be based, consciously or subconsciously, with varying degrees of commitment. The latter is a set of generally measurable qualities, escrow, status, reputation, and exchanges. The separation of these suggested that cryptomarkets, although they have many qualities that support trust, comparatively have little means to support product certainty. I then proposed a central causal process in the production of trust, experience, rendered operational as exchange. I argued that because the buyer is positioned as an entrant they can only rely on active trust production. However, through experience they can build abstract and interpersonal trust. Thus, drawing on Zucker (1986), rather than isolating trust to a specific mechanism, I operate within a general framework in which trust is produced through a process of social integration, a decidedly sociological position (Misztal, 1996, chapter 2).

Detailing the research agenda, I suggested that the body of literature on illicit online markets, and cryptomarkets by extension, struggles with the Hobbesian question, whether cooperation and cohesion emerges from self-interest or social power (Wrong, 1961). The notion of experience is utile here, because it presupposes that trust is an active cognitive process, subject to change and circumstances. Trust is socially embedded, not simply a reflection of the social system, or emerging from pure pursuit of self-interest (Möllering, 2005b; Simpson & Willer, 2015). Experience, as a concept and empirical event, does not restrict trust to belief or behavior, but invites investigating both. Whether drawing on the macro-level study of trust as beliefs about others, or the behavioral dimension of cooperation, both stress the Bayesianism of trust (Hardin, 1993). Similarly, the same causal process



**Figure 5.3** – Foci of the three papers.

is contained within the tendencies that draw on ethnomethodology and Bourdieu (Luhmann, 1979; Sztompka, 1999; Zucker, 1986), as it is in those who draw on rationality and information acquisition (Buskens & Raub, 2002; Hardin, 1993).

I proposed a conceptual model of how trust is produced in Figure 5.1. Here, the entrant encounters the market without any good reason to trust, other than the active production of trust; reputation systems, status, and escrow. On attaining experience the buyer may develop interpersonal and abstract trust – trust in the concrete and abstract other – the seller and the institution. This is the conceptual model that I set out to test, verify, examine, and scrutinize in the forthcoming chapters.

In Figure 5.3 a overview of the mechanisms examined in the forthcoming papers is shown. The first paper examines active trust production through price formation or valuation. The value attached to products. The key aim is to extend the reputation-valuation literature to examine the under-scrutinized influence of active trust production. The second paper examines the influence of experience and active trust production on interpersonal trust, rendered operational as the size of the wager of trust, cents and dollars. The third paper examines abstract trust, whether experience with the cryptomarket institution produces certain and positive beliefs.

## CHAPTER 6

### METHODOLOGICAL APPROACH

In the following sections, I outline the methodological approach that supports the forthcoming three empirical studies. Rather than reiterating what is already detailed in the individual papers, I instead seek to contextualize the approach and highlight the methodological priorities that undergird the collective work. As the empirical work is quantitative, I predominantly draw on quantitative applications but support these with insights from qualitative research.

I begin by introducing data collection in illicit online markets more in depth than is possible in the empirical papers. I then introduce the method used to collect data for two of the papers and discuss its advantages and shortcomings. I use data from two sources, the DATACRYPTO project which uses webcrawling and -scraping, and survey responses to the 2018 Global Drug Survey (GDS). I describe the latter separately and the first in extension of online data collection. Hereafter, I treat two general priorities that support the empirical research, how to increase generalizability, and how to approach the data statistically in extension of the theoretical framework laid out in the preceding chapters. Each paper uses multilevel linear regression and I give a brief introduction to its advantages in extension of the theoretical justification of its use, and highlight specific concerns in its application. I conclude the paper by situating each paper within the methodological agenda laid out in this chapter. Here, I introduce the GDS data separately, because the reliability and validity of it must be understood in the context of the research question and the methods I apply.

#### 6.1 Online data collection

Scholars are increasingly exploiting the internet as either a tool for data collection, or as a source of data. These methods are particularly relevant for studying

hidden or covert populations that use the internet, which explains the increasing adaptation within the study of crime, drugs, and illicit markets (Enghoff & Aldridge, 2019). Since the advent of academic research in illicit online markets, there has been an overlap between scholars in computer science and related fields and criminologists using these methods (see for example Christin, 2013; Enghoff & Aldridge, 2019; Soska & Christin, 2015). Apart from conceptual, institutional, qualitative, and analytical approaches, which rely on either ethnography or qualitative interviews (e.g. Bancroft, 2020; Tzanetakis, 2018b; Tzanetakis et al., 2016), the predominant method to collect data has been the application of a set of methods described using terms like web-o-metrics, digital trace analysis, crawling, spidering, and webscraping (Décary-Héту et al., 2016; Martin & Christin, 2016; Munksgaard et al., 2016). Fundamentally, scholars overwhelmingly discuss the same method, and significant differences predominantly emerge in the analytical approaches taken to the collected data. For consistency, I will use the terms crawling and scraping. This is a deliberate choice to specify function, rather than engaging in a larger discussion of terminology, concerning the theoretical aspects and legacy of the "digital trace" methodology (Venturini & Latour, 2010), and the variety of methods that go under the name web-o-metrics (Björneborn & Ingwersen, 2004; Munksgaard et al., 2016). I also refrain from discussing the application of similar methods to collect data from the darknet (Gehl, 2018), such as IRC channels and the like (e.g. Franklin et al., 2007). None of these points are of relevance to the methods applied in this work.

Websites consist of code which allow the server and user to collaboratively construct a page that manifests as HTML (Gehl, 2018). An example is shown in Figure 6.1, which is an advertisement from a cryptomarket. As a user requests the page, the server runs code that selects and shows information from a database, such as the price of the product, and this is then rendered in the browser. Most websites consist of pages that are linked together by URLs, links. Clicking one will bring the user to the next. For example, in Figure 6.1, the user may click a link to the seller's profile. Thus, the researcher could iteratively click links and copy the

Market Vendors Tutorials Forum Support Order Code USD


Search Q Market → Cannabis → Buds & Flower → **GEATO Smallbuds/Leftoffs FREE UK NDD**

**Categories**

- Benzos 62
- Cannabis 200
  - Buds & Flower** 56
  - Shake 1
  - Concentrates 47
  - Hash 13
  - Edibles 53
  - Seeds 0
  - Synthetic 2
  - Other 23
- Dissociatives 13
- Ecstasy 44
- Opioids 21
- Prescription 21
- Psychedelics 71
- Steroids 13
- Stimulants 64

**Leaderboard**

- NextGeneration
- bluemagic



**GEATO Smallbuds/Leftoffs FREE UK NDD**  
Weights 7g-14g

● NextGeneration 1502 9 9/30 Disputes Established Vendor

Open Orders: 263/300      Stock: 9999152 Grams  
Sales: 107                      Origin: United Kingdom  
Views: 3483                    Ships To: European Union  
Age: 6 Months                 Payment Methods:

Smallbuds/Leftoffs from the bottom of the jar. You will receive minimum 7.2 to compensate stalk(small sticks).

Order
Reviews
Trust Scan
Refund Policy
PGP

Positive	Seized by customs unfortunately	09/01/20
Positive	Great vendor Nice 1	09/01/20
Positive	Very gd stuff. Obsv just shake. NDD	08/30/20
Positive	Good product and stealth. Tx	08/30/20
Positive	Good stuff	08/29/20

Full Reviews

Figure 6.1 – A product for sale in a cryptomarket.

content for later use.

One approach to data collection is to do this manually, simply keeping up continual monitoring either through screenshots, by saving the code that is rendered by the browser, or by copying it into a spreadsheet. For example, Surmont et al. (2018) sample and manually code data from 170 websites offering synthetic cannabis in bulk chemical form, to estimate the profits of producers who process it into a smokeable product. Similarly, Van Buskirk, Naicker, Roxburgh, Bruno, and Burns (2016) and Van Buskirk, Bruno, et al. (2017) either sample or collect all products for sale on the cryptomarkets Agora and Evolution. This is done by manually saving the markup, HTML, which is rendered by the browser. As websites reach a certain scale, this starts to become an uneconomical, possibly infeasible, endeavor. For example, Van Buskirk et al. (2016) reach an impressive average of more than 14,000 products offered across 7 samples. That is, each sample consisted of 14,000 copies of products. The markets analyzed in this dissertation consist of hundreds of thousands of pages, rendering such a task infeasible. Crawling simply consists of the automation of the copy-and-save workflow one could do by hand.

Figure 6.1 shows that an abundance of information is available. The name of the seller, some recent reviews, price, the seller's number of disputes, and so forth. The data collected through crawling is therefore not immediately ready for analysis, but must be scraped. Despite their manual approach to collection, Van Buskirk, Bruno, et al. (2017) automate this process using the programming language VBA. Scraping is simply the automated extraction of data. Typically, scholars automate both processes (e.g. Broséus, Rhumorbarbe, et al., 2016; Dolliver & Love, 2015; Lamy et al., 2020; Morelato et al., 2020).

The data may, after crawling and scraping, be stored according to the researcher's preference. Spreadsheets may be used, or a full-fledged database can be used (Décary-Héту, Paquet-Clouston, Bouchard, & Morselli, 2019). However, only limited data is immediately usable for analysis, and scholars will frequently need to standardize data. For example, Przepiorka et al. (2017) and Hardy and Norgaard (2016) use either manual or automatic coding of quantities. Similarly, sellers may



misspell country of origin, necessitating standardization as well (Demant, Munksgaard, Décary-Hétu, & Aldridge, 2018). Websites, particularly cryptomarkets, will typically put products in categories (Tzanetakis, 2018b). However, the categories may be less usable by the researcher, who may, for example, be interested in separating amphetamine from cocaine, while the platform puts both in the category stimulants. This has motivated the use of machine-learning classifiers, specifically, supervised text classification (see Grimmer & Stewart, 2013, for an introduction). Based on a training data set, these are able to, with a high degree of certainty, classify a product into preexisting categories (see for example Demant, Munksgaard, Décary-Hétu, & Aldridge, 2018; Soska & Christin, 2015, for applications).

With the data stored and standardized, the researcher can commence analysis. An important innovation here is to associate feedback with a seller or a product. Doing so, the revenue of a seller can be calculated. Paquet-Clouston et al. (2018) use such an approach to study the competition between vendors in a cryptomarket. Similarly, the country of origin for a product may be used to examine the geographical dispersion of sellers, products, or sales (Demant, Munksgaard, Décary-Hétu, & Aldridge, 2018; Dolliver, Ericson, & Love, 2016; Van Buskirk et al., 2016). Time may also be included as a dimension, allowing the study of temporal trends in sales (Décary-Hétu & Giommoni, 2017), or transaction size (Demant, Munksgaard, & Houborg, 2018). However, an important caveat is that not all transactions result in a buyer leaving feedback. Kruithof et al. (2016) estimate that only between 71-81% of feedback is observed (see also Stinenbosch, 2019).

### **Issues in online data collection**

In the study of cryptomarkets, the potential issues of validity and reliability emerged in 2015 following a study by Dolliver (2015). The study received substantial critique (Aldridge & Décary-Hétu, 2015; Buskirk, Roxburgh, Naicker, & Burns, 2015), and failed to replicate using a similar dataset (Munksgaard et al., 2016). In the context of this debate, the primary problem was whether the dataset used in the original article was incomplete or skewed. For technical reasons, a crawler may

be unable to collect all pages, or a crucial one, for example, one link taking it to the category of ketamine products. In the latter case, no ketamine products would be observed, whereas the former would mean only collecting a proportion of products. Consequently, Munksgaard et al. (2016) highlight the necessity of validating data through explorative analysis, qualitative comparisons to the website in question (e.g. by comparing the number of advertised products to the number collected in crawling), and monitoring of error logs.

More specific issues also emerge, often because sellers do not use platforms as intended. For example, when running low on stock, a seller may choose to pause an advertisement by setting an unrealistically high price, what Décarry-Hétu et al. (2016) refer to as "holding prices". For example, a buyer may purchase a product at 13 USD, after which the seller adjusts the price to 10.000 due to low stock. Should the researcher observe the product at the latter price, then it may appear as if the product was sold at this extreme price. Consequently, scholars may choose to set an upper bound and discard any product above that level (Aldridge & Décarry-Hétu, 2016; Soska & Christin, 2015), or use the median observed price (Cunliffe, Décarry-Hétu, & Pollak, 2019). Similarly, sellers may put products in the wrong category, hoping to reach more customers, in which case machine-learning classifiers are helpful (Soska & Christin, 2015).

Issues of validity and reliability stemming from insufficient standardization or filtering, and data collection procedures, can be examined statistically and technically. For example, by reviewing the number of errors a crawler encounters (Munksgaard et al., 2016). Furthermore, it is important to note that statistical analyses do not require data on the entire population (e.g. all products in the market), but can perform just as well on random samples (Gelman & Hill, 2007). For example, if the goal is to measure the quantity discount and price per gram of cannabis, it is reasonable to expect that a sample can be sufficient.

When it comes to the practical application of preprocessing and validating data collected online, there are no established guidelines, even in the cryptomarket literature which has exploited the method to an unprecedented degree (Enghoff &

Aldridge, 2019). Fundamentally, there are different ways to prepare data for statistical analysis, and the analytical strategy and research aims should exploit possibilities of the data at hand. An example of this is Morelato et al. (2020) who instead of feedback use the number of sales shown on the website, thus circumventing the issue of coverage of feedback. When I later discuss the concrete application of crawling and scraping, I therefore detail some choices based on this argument.

### **Observed and unobserved**

A more troubling problem than data quality is what is technically observable. Cryptomarkets are, as discussed in Section 3.4.4, social constructions; code that brings markets into being (Langley & Leyshon, 2017; Muniesa et al., 2007). The problem, however, is that some things are simply not measurable through webcrawling, or only are so on rare occasions. For example, in the study of cryptomarkets, only a small minority of platforms allowed scholars to observe repeated exchanges because reviews were anonymous. Décary-Hétu and Quessy-Doré (2017) develop a method to handle this, weighting observations by the rarity of partly censored usernames (e.g. ra\*\*us). Some smaller markets, specifically Abraxas, Silk Road 3.1, and an unnamed cryptomarket, provided uncensored usernames or identifiers. These unique cases significantly contributed to the literature showing tie formation, robustness of exchange networks, and documenting repeated exchanges (Duxbury & Haynie, 2018a, 2018b, 2020; Norbutas, 2018; Norbutas et al., 2020a). Data that allow scholars to probe exchange ties, however, is relatively rare, but in a minority of cases is it available. The case of exchange ties is a stark reminder of how the code that brings illicit markets into being constitutes a serious challenge to research. Had this data been unavailable, scholars would, in effect, still be studying what appeared as socially atomized markets, oblivious to the now documented patterns of repeated exchanges (Décary-Hétu & Quessy-Doré, 2017; Duxbury & Haynie, 2020; Norbutas et al., 2020a).

More problematically, some things are simply unobservable using crawling. In Section 4.4 I highlighted how a significant proportion of the literature on trust

hardly studies cooperation, but instead examines beliefs and attitudes using surveys (e.g. Sztompka, 1999; Uslaner, 2008). While some novel methodologies are promising, namely, the automation of textual analysis through supervised or unsupervised topic modeling (e.g. Kigerl, 2018; Lorenzo-Dus & Di Cristofaro, 2018; Porter, 2018), these emphasize discourse over sentiment (Munksgaard & Demant, 2016). There is therefore a significant research gap in terms of sentiment and expectations, which are fundamentally unobservable using the traditional methods of data collection for quantitative research in the study of illicit online markets.

### **Online data in the dissertation**

There are several advantages to crawling and scraping data. Principally, it can provide observational data on otherwise hidden populations, in this case, drug buyers and sellers (Enghoff & Aldridge, 2019; Munksgaard et al., 2016). Compared to traditional modes of data collection, such as the use of police, surveillance, or court records (e.g. Athey & Bouchard, 2013; Malm & Bichler, 2011; Moeller, 2012, 2018b), it is both cost effective and can include much larger populations (Décary-Hétu & Aldridge, 2015). In some cases, an almost complete population can be analyzed.

For the two articles that use data collected through crawling, I use datasets from Empire Market, Silk Road 3.1, and Abraxas Marketplace. The Empire Market and Silk Road 3.1 datasets are collected as part of the DATACRYPTO project. Several papers rely on data from this archive, and its reliability is well established (see for example Cunliffe, Martin, Décary-Hétu, & Aldridge, 2017; Demant, Munksgaard, Décary-Hétu, & Aldridge, 2018; Martin et al., 2018; Paquet-Clouston et al., 2018). As a research assistant to this project, I was involved in the data collection process and subjected the datasets to the recommended tests, both in this role and before any analysis was undertaken (Aldridge & Décary-Hétu, 2015; Buskirk et al., 2015; Munksgaard et al., 2016). This included verifying the completeness of crawls, whether the entire site was crawled, and descriptive analysis of origin countries and revenue distribution in categories, to confirm that general observations in the lit-

erature would replicate (e.g. Christin, 2013; Demant, Munksgaard, Décary-Hétu, & Aldridge, 2018; Soska & Christin, 2015). As opposed to the Silk Road 3.1 and Empire Market datasets, the Abraxas dataset was scraped from the already existing archive maintained by Branwen et al. (2015), but it was still subjected to the same tests. Detailed descriptive statistics of the datasets, additional information on post-collection processing of them, and the justification for using them are provided below and within the articles. When the datasets exhibited indications of incompleteness, particularly a problem with Abraxas, these are detailed in the articles, and in their corresponding sections later in the chapter.

There is no ethical consensus on the use of data collected through webcrawling from websites that are public (Enghoff & Aldridge, 2019). Cryptomarkets classify as such, and the data provided is already anonymized (Décary-Hétu & Quessy-Doré, 2017). Following the principle of harm minimization, Demant, Munksgaard, and Houborg (2018) suggest balancing the number of concurrent page requests to ensure that the bandwidth of a website is not overwhelmingly used by a crawler, whereas Décary-Hétu and Aldridge (2015) suggest this as a strategy to remain covert. DATACRYPTO automatically adjusts its speed based on the website's response time, for both purposes, and thus mitigates what was the primary ethical concern. Given that data was anonymous and posed no risk of harm, the data collection was granted an ethical exemption by the Comité d'éthique de la recherche - Société et culture (CERSC).

## **6.2 Assumptions and methodological concerns**

In extension of the methodological concerns associated with online data collection, there are also more abstract concerns that guide the methodological approach of the forthcoming chapters. Fundamentally, these are concerns that revolve around producing robust and replicable research in order to make knowledge claims. First and foremost, the two papers that use data collected from cryptomarkets use individual datasets processed and prepared in accord with their objectives. Second,

these papers test hypotheses on multiple datasets to increase generalizability. Finally, each paper applies multilevel linear regression in direct extension of the theoretical framework. In the following sections, I detail these priorities. I begin by highlighting some concerns about generalizability and knowledge claims, conceptually and practically. Hereafter, I discuss multilevel regression emphasizing how it is in extension of the theoretical framework. Finally, I detail each of the datasets used and highlight how these priorities are implemented in practice.

### **6.2.1 Generalization, social significance, and online data**

Frequently, studies that examine online phenomena use datasets from one platform, but the implications are not always clear. There is, however, between-platform variance, and each platform constitutes a unique and discrete manifestation. J. L. Davis and Love (2019) sum up the scholar's dilemma using online data as such: "A conservative approach to social media data in which analyses remain platform specific ensures a high standard of research integrity. However, limiting the use of social media data exclusively to studies of social media stifles research potential" (p. 640). Compared to social media (e.g., Twitter versus Facebook), there is arguably more similarity between illicit online market platforms (Martin et al., 2019). These generally use the same components to build trust, and it is reasonable to assume that these perform similar functions (Bakken et al., 2018; Tzanetakis, 2018a). This is the assumption when scholars use data from one platform to argue that, for example, reputation supports cooperation (Hardy & Norgaard, 2016; Przepiorka et al., 2017).

The principal problem with using online data is whether to consider it as representative. Arguably, when studying a platform that attracts only a certain segment of a population, there is a limit to what claims can be made since the data is demographically skewed (J. L. Davis & Love, 2019; Enghoff & Aldridge, 2019). In the case of cryptomarkets, the Global Drug Survey has shown a userbase that skews young, male, and educated (Barratt, Ferris, & Winstock, 2014). Studies using crawling have similarly documented that activity is predominantly in the

Global North; Europe, Australia, New Zealand, and Australia (Cunliffe et al., 2017; Demant, Munksgaard, Décary-Héту, & Aldridge, 2018; Dolliver et al., 2016; Munksgaard et al., 2019; Van Buskirk et al., 2016). Consequently, some claims to knowledge are limited to the platform population. In other words, it is reasonable to posit that data collected through crawling can map the geographic composition of sellers and buyers within some margin, but one cannot take this as a proxy of global drug consumption or prevalence (Enghoff & Aldridge, 2019). However, care must also be taken to not discard any social or theoretical significance of analyses. As J. L. Davis and Love (2019) argues, "[surely] researchers can say something meaningful about broader social patterns with these newfound data" (p. 646). Thus, a balance must be struck between empirical limitations and social claims.

J. L. Davis and Love (2019) suggest that inspiration should be drawn from laboratory studies, and that a formal theory approach is applicable in this context. This is the basic reasoning behind the laboratory studies discussed earlier, "that careful artificial design allows researchers to isolate theoretical variables of interest and test theoretical hypotheses" (p. 641). As an example, they use the responses of vegan commenters on two YouTube videos, to argue that their emotional valence support tenets of identity theory, specifically regarding collective identity theory used in studies of social movements. Here, the proposition that is tested is that vegans will react more negatively to the video that challenges their belief system, than the one that affirms it. The argument is therefore that generalization can be theoretical and propositional, rather than empirical. This is the reasoning that undergirds the propositions set out previously, which are based on an integrative approach to the literature. For example, that risk-taking in cooperative ventures is supported by uncertainty reducing mechanisms (e.g., reputation, status, and escrow). Similarly, this may also be argued to be the reasoning of studies that argue that reputation systems can create order absent a state (Diekmann et al., 2014; Diekmann & Przepiorka, 2019; Eschenbaum & Liebert, 2019; Hardy & Norgaard, 2016; Przepiorka et al., 2017).

Another aspect of generalization, and the capacity to make coherent and realis-

tic claims to knowledge, concerns the practical aspects of analysis and presentation. My priorities are simple and draw on the current debate in criminology, which may be argued to find itself in the throes of an emerging replication crisis, or, at least an increased emphasis on transparency in research (Pickett, 2019). While this work should not be considered as a contribution to this debate, I make practical choices which I believe increase such transparency. First, I prioritize replication by design, and second, I seek to present transparent results in a manner that allows the reader to evaluate their social significance, and not only rely on my interpretation.

Bernardi, Chakhaia, and Leopold (2016) argue that the reliance on significance stars has the consequence that the practical relevance, the social significance, of findings may be neglected. This becomes particularly pressing when datasets are large, as is the case for all three studies. As Khalilzadeh and Tasci (2017) note in a discussion of "big data", "as the sample size grows and becomes closer to the real-world population size, the power of the test also increases, identifying small, impractical effects" (p. 90). Whether the data used in the forthcoming articles classifies as "big data", is not as important as how to conceive of effects and coefficients. In my application, I stress interpretability, replication by design, and seek to translate the results into graspable quantities.

Carver (1993) suggests some alternatives to treating  $p$ -values as an end in themselves. The subject matter at hand of course determines the appropriate strategy, but principally, it is important to discuss effects, rather than significance. In the first study, in which I analyze how sellers respond to active trust production, it is, for example, more coherent to present the estimated difference in cents and dollars between products in and outside escrow. A difference of 5 cents may be statistically significant, but its implications for social organization are likely negligible. In this case, the social significance is better measured in cents and dollars (Bushway & Reuter, 2008, 2011). Conversely, our finding that a gram of cannabis sourced from a legal market is about twice as expensive as regular cannabis is a much more significant finding, though this is a finding that should be interpreted relative to the rarity of legal cannabis in cryptomarkets. Drugs are a fortuitous case, because they



are sold in quantities in exchange for money. This is an easily graspable quantity, and there are established and concrete measures, for example, concerning quantity discounts (Caulkins & Padman, 1993). As I discuss the individual papers below, I will make a point to highlight how I approach this.

Another way to support a social significance approach, which in turn also supports the case for generalization, is to use "parallel data" (Bernardi et al., 2016). Carver (1993) suggests, for example, splitting an experimental dataset across gender to do a "split-half replication check" (p. 291). Put simply, "coefficients of a similar size estimated on different data sets provide more robust evidence than a statistically significant coefficient estimated in a single data set" (Bernardi et al., 2016, p. 7). In the second article, I find almost identical coefficients for the association between risk-taking and exchange history with a seller in two different platforms. Conversely, the third article shows that the increase in beliefs that follows from using a cryptomarket varies between countries. Both are important findings. In the articles, and the discussion of this work, I grade the strength of evidence based on these built-in replication checks.

These two suggestions, graspable quantities and replication, are particularly relevant for the empirical work in this dissertation. The suggestion to discuss actual effects is in natural extension of studies one and two, for which the outcomes are price and financial risk, both measurable in dollars and cents. Furthermore, since there is a variety of platforms, replication checks are provided by the environment: Two markets can be compared, and effects can be compared across drugs. As an example of the complexity added, Przepiora et al. (2017) use a categorical variable with three outcomes to represent seven drugs in one regression model, whereas Espinosa (2019) analyzes four drugs separately. Interestingly, the latter study did not consistently replicate the finding that sellers increase prices when gaining reputation, something that Eschenbaum and Liebert (2019) also encounters. The case is different for the survey data I use, which may be limited by its representativeness, a problem I discuss later.

Thus, the strategy of analysis of the forthcoming chapters emphasizes gener-

alization in a formal theoretic manner. In applied statistics, I stress coefficients, preferably as cents and dollars, rather than statistical significance. And when possible, I utilize multiple datasets to support generalizability. As will become apparent, this makes my claims of knowledge more restricted and less forceful than some research, though the foundation is argued to be more robust.

### 6.2.2 Multilevel regression

For applied statistics and inference, an intuitive explanation is often more beneficial than a theoretical one (Gelman, Hill, & Vehtari, 2021, p. xi). The statistical approach of this dissertation is in direct extension of the theories discussed until now, and to illuminate on the motivation for the application, I use an example based on the first paper to connect theory and application. The dataset consists of repeated measurements, reduced to one observation per product in this example, of heroin prices per gram across multiple quantities. It provides an exemplar case with a relatively large sample size ( $n = 2,181$ ). Fundamentally, this dataset is comparable to the STRIDE database provided by the US Drug Enforcement Agency, DEA, which collects price data on drugs across the country that can be used to model drug prices. STRIDE is frequently used in the analysis of drug prices, and so can this dataset (Reuter & Caulkins, 2004; Thompson & Jeffords, 2019).

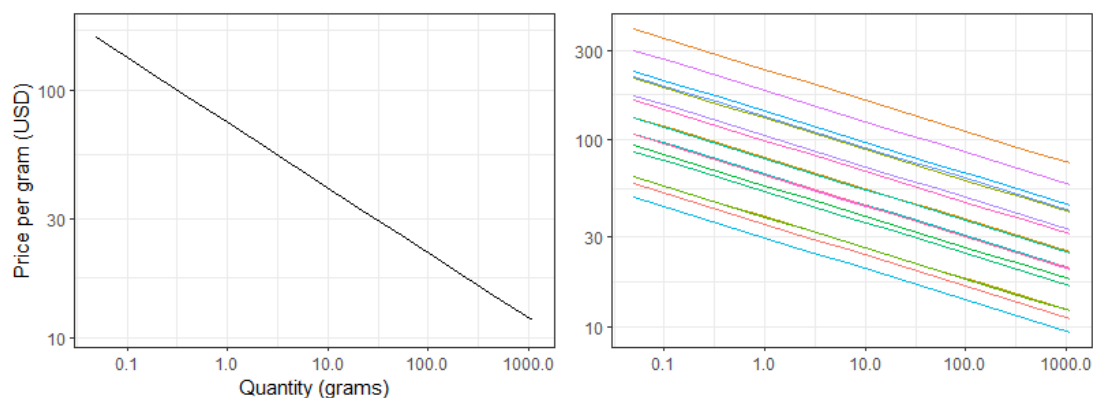
Multilevel regression, also known as mixed effects regression or hierarchical regression (Gelman & Hill, 2007, p. 2), is extensively used within criminology and sociology because social data tends to be clustered or grouped (B. Johnson, 2010; Schmidt-Catran & Fairbrother, 2016). In grouped data, the observation of a data point, such as the price of a gram of heroin, may be correlated with observations from the same group. One of the assumptions of ordinary least squares regression (OLS), or multiple linear regression, is that errors are uncorrelated (i.e. "independence of errors", Gelman & Hill, 2007, p. 46). If errors are correlated, however, then violating this assumption underestimates standard errors, and the risk of producing a Type I or II error, a false positive or false negative, increases (Harrison et al., 2018). Grouped data, such as drug prices nested in different

countries, is such an example. This is the reasoning behind applying multilevel regression above regular OLS. The researcher may wish to simply "control" for this group-level variance, or it may be considered theoretically relevant. Gelman and Hill (2007) argue that even if the data does not show grouped tendencies, a multilevel approach will yield the same results as OLS (p. 270). Thus, there is little reason to not consider the approach if there is a slight possibility that there are within-group correlations.

The basic insight of the risks & prices framework is that risk from law enforcement, particularly during the import stage, is the primary driver of price (Reuter & Kleiman, 1986). If our price data was clustered in counties or municipalities, then this grouping structure would be a natural assumption since drug enforcement likely varies (Caulkins, 2007; Reuter & Caulkins, 1998). Grouped in countries, however, we can reasonably assume that heroin prices in countries differ, because it is particularly the import stage of drug trafficking that increases the price (Adler, 1993; Boivin, 2014). The basic multilevel application adjusts for grouped data by allowing every group to have a separate intercept, a group-intercept model. This simply means that we assume statistically that every country may have a price that differs slightly, or extensively, from the population average.

To demonstrate the case, a standard OLS regression and a multilevel regression are estimated. Caulkins and Padman (1993) suggest two ways to measure quantity discounts of illicit drugs, which are, put simply,  $\log(\text{price}) = \log(\text{quantity})$  or  $\log(\text{price} - \text{per} - \text{gram}) = \log(\text{quantity})$ . I use the latter, in which the coefficient may be interpreted as such: A 1% increase in quantity yields the corresponding percentage change in price-per-gram (Caulkins, 1994). The sole difference between the two models is that in the multilevel model the intercept of price-per-gram is allowed to vary between countries.

Figure 6.2 shows the quantity discount of heroin based on both models. Two visual observations are immediate: The slope of the OLS model is steeper than the multilevel model, and the multilevel model shows large differences in country-level intercepts. In some countries, the price of a gram is well below 100 USD, while



**Figure 6.2** – Estimated price-per-gram price of heroin as a function of quantity ( $n = 2.181$ ). Left figure assumes all countries have a similar quantity discount and price intercept. Right figure allows a separate intercept for each country (colored).

in others it is above. In terms of social significance, these are drastic differences, because the economic approach to illicit markets, as discussed in Section 2.3.1, has been particularly interested in how price affects consumption (Bushway & Reuter, 2011; Caulkins & Reuter, 1996; Reuter & Kleiman, 1986). In the OLS model, the price of a gram of heroin is estimated to be 77 USD (CI: 57.0-104.1 USD), whereas the multilevel model estimates 73.8 USD (CI: 71.1-76.6)<sup>1</sup>. More interestingly, the estimated quantity discount differs between the two models. In the OLS model, it is -0.26, suggesting a reduction in price per gram of 0.26% per 1% increase in quantity, as opposed to -0.16 in the multilevel model (Caulkins & Padman, 1993). Typically, the motivation for using multilevel models is to make better inferences by correctly estimating standard errors. However, incorporating grouping structure may also change parameter estimates (see for example Schmidt-Catran & Fairbrother, 2016), in this case, drastically. The extent of the change in these model estimates is likely due to omitted variable bias, "confounding" or "lurking" variables, from excluding countries in the OLS regression (Gelman & Hill, 2007, p. 169).

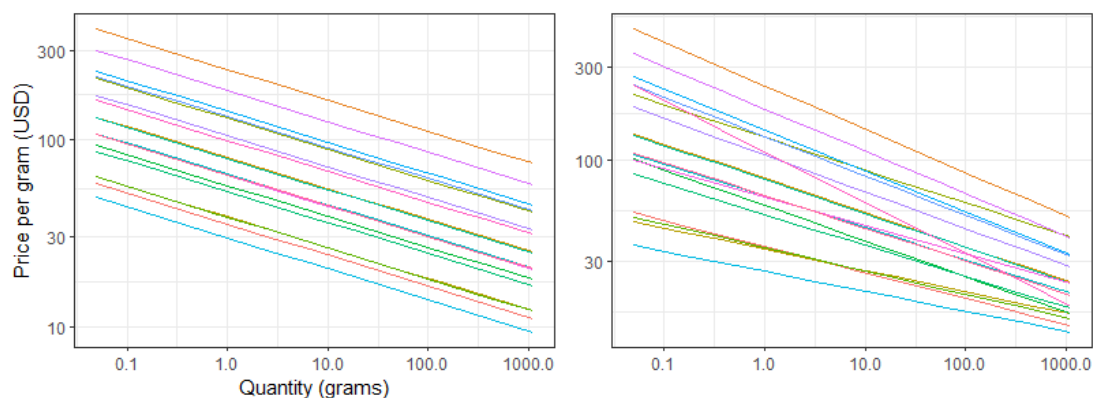
Adding a separate group intercept is a simple multilevel model, a group-intercept model. The quantity discount is in this model a fixed effect, meaning that it is a

<sup>1</sup>Note, that confidence intervals cannot directly be compared because the multilevel model estimates a standard deviation for each country-level intercept.

population level estimate, whereas the group-level intercept varies. The distinction is also referred to as "random" and "fixed" effects (Harrison et al., 2018), whereas some disciplines prefer the term "contextual" effects instead of random or group (Gelman, 2006). Multilevel models, however, can be extended beyond group intercepts.

Because price is a function of risk sellers accumulate more risk when stocking inventory. Research suggests that sellers adjust for this risk by discounting product as the quantity increases to expedite sales and minimize risk (Moeller & Sandberg, 2019). It is therefore reasonable to suggest that not only does the intercept vary, but the slope may as well, because sellers in different countries are subject to different levels of risk. Thus, price as a function of quantity varies according to risk. Intuitively, this suggests that there is an interaction between discount and risk. The multilevel model can be specified to include a group-level slope, a separate coefficient for each group. This is also known as a random slope or coefficient. Gelman & Hill (2007, p. 282) argues that, intuitively, these are comparable to interaction terms in OLS regression. Thus, observing that price varies by country as a function of risk, it is reasonable to posit that quantity discount does so as well. In Figure 6.3 this slope is added, and quantity discounts are allowed to vary per country. Interestingly, the coefficient for quantity discount is observed to vary between countries, and a negative correlation is observed: When a country has a higher price of one gram of heroin, the quantity discount is steeper. The population level estimate also slightly changes to -0.17. The country-level variance in quantity discounts is in accord with the risks & prices framework, which would suggest that higher risk correlates with steeper discounts (Caulkins & Reuter, 2010; Moeller & Sandberg, 2015; Reuter & Kleiman, 1986).

The example of heroin prices is illustrative because the data is grouped, and there is a theoretical and empirical motivation to assume country-level variance. As the example suggests, neglecting this structure would violate the assumption of independence of errors. Furthermore, while all three models confirm that there is a quantity discount on heroin, the discount is steeper in the OLS model than the



**Figure 6.3** – Estimated price-per-gram price of heroin as a function of quantity based ( $n = 2.181$ ). Left figure allows a separate intercept for each country, while the right figure adds a separate coefficient for every country

multilevel models. Thus, rather than producing a Type I or II error, the example therefore suggests that not accounting for the grouping structure would have yielded a magnitude error, overestimating the quantity discount. Adding a little additional complexity to the model, what essentially amounts to an interaction term (Gelman & Hill, 2007, p. 282), we come to a model that corresponds to the paradigmatic framework of the criminology and economics of drug markets (Bushway & Reuter, 2008; Reuter & Kleiman, 1986).

Disciplinary differences and tradition suggests that economists prefer fixed effects regression (Bushway & Reuter, 2008), in which standard errors incorporate the grouping structure (Bell, Fairbrother, & Jones, 2019). Such models are predominantly used in the study of drug prices, both online (Červený & van Ours, 2019; Eschenbaum & Liebert, 2019; Espinosa, 2019; Przepiorka et al., 2017), and offline (Caulkins & Padman, 1993; Smart et al., 2017). Online, scholars tend to correct for the between-vendor group structure (i.e., seller heterogeneity), whereas offline it is predominantly time. The example above does not account for vendor-level variance, but the advantage of multilevel modeling is that the model can account for both between-vendor and between-country variance (Gelman & Hill, 2007). Thus, when prices are analyzed in the next chapter, vendor-level variance

is also included. For comparison, I estimated three additional models, adding a vendor-level intercept to the two multilevel models above, and a fixed effects regression that incorporated seller heterogeneity, the standard econometric model. These models yielded population level estimates of heroin quantity discounts of -0.16, -0.13, and -0.15, a comfortable, though still varying, margin when compared to the OLS estimate of -0.26. The smaller margin is likely because the variance in seller-level prices is correlated with the variance in country-level prices.

It is beyond the scope of this dissertation to evaluate whether the econometric or multilevel approach is the ideal statistical choice, which would require engaging in the debate between fixed effects and multilevel regression models (Bell et al., 2019). However, the multilevel framework provides several immediate benefits. First, allowing multiple group-levels is a natural extension of the theoretical framework, and also a basic statistical choice that must be made since grouped data is used (Gelman & Hill, 2007; Schmidt-Catran & Fairbrother, 2016). The data also distinguishes itself from what is traditionally used in the study of offline markets (e.g. Caulkins, 2007), because it is nested in sellers and countries, and it is problematic to assume that this level can be assumed subsumed under seller-level variance using a fixed effects model (Schmidt-Catran & Fairbrother, 2016). As discussed in Chapter 2, illicit markets are heterogeneous and the state is constitutive (Beckert & Dewey, 2017b; Reuter, 1984). Thus, it is reasonable to expect between-country variation in market organization (e.g. prices), and by extension, between vendors who are likely operating out of different locales within a country (Reuter & Caulkins, 1998). Similarly, a key insight in studies of generalized trust is that responses vary across countries (Dawson, 2019; Sztompka, 1999), and thus risk-taking and beliefs in the cryptomarket institution may also vary.

### **6.3 Empirical papers**

In the following sections I detail the individual papers which are presented in the following three chapters. The three papers examine trust on the basis on the

Concept	<i>Uncertainty and Risk</i>	<i>Building a case for trust</i>	<i>A change of expectations?</i>
Trust	Transaction value	Price per gram	Beliefs in product value, purity, weight, and price
Experience	Sum of exchanges with seller		Use of a cryptomarket within preceding 12 months
Escrow	Centralized escrow 50% Centralized escrow Multisignature escrow Early finalization/advance payment	Centralized escrow Multisignature escrow Advance payment	
Status	Seller level Seller trust level	Seller level Seller badge	
Reputation system	Positive reviews (lifetime) Negative reviews (lifetime)	Positive reviews (lifetime) Negative reviews (lifetime)	

**Table 6.I** – Operationalization of key concepts

conceptual model laid out in Section 5.3, and each deal with the production of trust from a different angle. One treats trust from an economic perspective, as the production of expectations of quality and honesty reflected in price (Akerlof, 1970; Beckert & Wehinger, 2013). The second paper treats cooperation, the behavioral aspect of trust, the approach that is taken by criminologists in general (Gambetta, 1988b; von Lampe & Johansen, 2004). And the third paper treats the production of trust as general and abstract beliefs about what is expected of others, the perspective traditionally taken by sociologists and political scientists (Dawson, 2019; Sønderskov & Dinesen, 2016; Sztompka, 1999; Uslaner, 2008). A brief overview of the theoretically grounded variables are shown in Table 6.I.

The papers *Building a case for trust* and *A change of expectations?* include the experience component of the model. In the former, it is hypothesized that repeated exchanges produce interpersonal trust, which is rendered operational as a propensity to engage in more risky cooperative ventures (i.e. larger future transactions). Experience is thus rendered operational as past exchanges with a seller. In the latter, it is hypothesized that experience with a representative of the institution (i.e. a seller), is conducive to abstract and general beliefs in the performance of cryptomarkets. Here, experience is rendered operational as being a cryptomarket buyer. The third paper does not include the experience component, but seeks to exclusively examine the active production of trust. This is reflected in the title,



which emphasizes the reduction of uncertainty as the central social process (Beckert & Wehinger, 2013).

The two papers *Building a case for trust* and *Uncertainty and Risk* both use cryptomarket data collected through webcrawling. Data was collected longitudinally, and treated in a similar manner. In the first, the dependent variable is the value of a transaction, and in the second it is the price per gram of a product. In both cases, key explanatory variables are derived from the conceptual model and the concepts introduced previously. In both articles the active production of trust is included through escrow, status, and reputation systems. In both cases, the independent variables are matched to the dependent variable based on the smallest time difference. For example, different transactions with a seller each have a corresponding status level, escrow, and reputation score that represents these values at the point closest in time. In *Uncertainty and Risk*, this means that a product is observed under varying conditions of each variable if these change. For example, a product may be seen a 0, 17, and 568 seller reviews.

It is important to note that status and reputation are not absolutely independent. Status is derived, on Empire Market and Silk Road 3.1<sup>2</sup>, from a seller's performance, namely their reputation score. In Chapters 3 and 5 I outlined the qualitative difference between the two; status is assigned by the administration, whereas reputation is generated by others. In the paper, we suggest conceiving of this as a "market device", a socio-technical device that supports the capacity to compare and calculate (Muniesa et al., 2007). We highlight that it is a simpler task to compare two levels, rather than making individual calculations and comparisons of feedback. Thus, there is a distinct qualitative difference between status and reputation, which motivates including both in models.

Whether it is statistically sound to include both status and reputation depends on whether the two variables are correlated. For example, when we replicate a cross-sectional design of Espinosa (2019) in *Uncertainty and Risk* we are incapable

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<sup>2</sup>As detailed in the paper, it was not possible to deduce what metrics Abraxas used to generated badge.

of including status as it is correlated with reputation. However, in a longitudinal design the two will correlate to a lower extent. For example, if a product is seen at 0, 3, 5 and 13 positive reviews, and the threshold from being level 1 to level 2 is 10 positive reviews, then there is more variation. In both designs there is no indication of multicollinearity, and our findings suggest that both variables have an effect on how sellers set price. Finally, it is important to stress that in both papers negative feedback, which has no relation to status, are included as well. Our failure to replicate reputation effects consistently include negative reviews, which are unrelated to status. Thus, our conclusions concerning the reputation system do not hinge on including status, since sellers should respond to negative feedback by decreasing price, and we do not observe this consistently (Diekmann et al., 2014; Przepiorka et al., 2017). It must be noted that results could be more robust if the data was more detailed, or social organization was different. There were no identifiable markets which provided either reputation or status exclusively. Nor was it technically feasible to monitor, for example, a price at every imaginable feedback value. Finally, attention is drawn to the results presented and their relative social significance, discussed in depth later.

Each paper includes a temporal aspect, though these are not central to the analysis. This derives from the conceptual model I have suggested, in which trust is contingent on a Bayesian process. In *Uncertainty and Risk* we analyze price setting at varying values of active trust production; in *Building a case for trust* I examine transaction values at in relation to past exchanges; and in *A change of expectations?* we create a hypothetical scenario in which we compare buyers to non-buyers. In the first, temporality is represented through the adjustment of price in response to active trust production. In the latter two, the temporal aspect is in the experience component.

### 6.3.1 Prices and active trust production

The article *Uncertainty and Risk: How actors set prices in online drug markets* examines how sellers respond to changes in uncertainty by setting prices. Method-

ologically, this paper builds on two distinct bodies of research. First, we examine prices in cryptomarket as is done by Eschenbaum and Liebert (2019); Espinosa (2019); Hardy and Norgaard (2016); Przepiorka et al. (2017) and Červený and van Ours (2019), who document the effects of the reputation system. Second, we explicitly assume and account for country-level variation in drug prices, and draw on a larger body of research into drugs as distinct products.

In the study, we analyze three different drugs, cannabis in its herbal form, cocaine, and heroin, in two cryptomarkets, Empire Market and Silk Road 3.1. Thus, hypotheses are tested in maximally<sup>3</sup> six scenarios as recommended by Carver (1993) and Bernardi et al. (2016). Contrary to this, Hardy and Norgaard (2016) analyze cannabis sold by American sellers, Przepiorka et al. (2017) analyze all drugs in one model, and Červený and van Ours (2019) analyze cannabis exclusively. Espinosa (2019) and Eschenbaum and Liebert (2019) build in replication and present estimates for four and eight substances separately. Interestingly, in both cases the coefficient for reputation is not consistently significant and varies. Only Eschenbaum and Liebert (2019) use data from more than one platform.

In terms of group structure we also differentiate ourselves. Červený and van Ours (2019); Espinosa (2019) and Hardy and Norgaard (2016) use data from one crawl, Przepiorka et al. (2017) use the first observation of each product, and only Eschenbaum and Liebert (2019) use longitudinal data. All estimate fixed effects regression and estimate within-seller effects<sup>4</sup>, accounting only for vendor-level variance, except for Eschenbaum and Liebert (2019) who use within-item measurements. Conversely, we use a longitudinal dataset of repeated measurements and therefore estimate within-item effects using a four-level multilevel model. This produces an intercept for each country and vendor, and a slope for each country.

We also take advantage of the feasibility of collecting repeated measures using crawling. Since website layouts rarely change, and products stay online for longer periods (Christin, 2013), measuring the same advertisement a second time

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<sup>3</sup>One market was almost exclusively escrow, and thus did not allow testing for price differences between early finalization and escrow.

<sup>4</sup>In an appendix Espinosa (2019) provides both multilevel and fixed effects models.

is less costly than the first. While more complex in terms of preprocessing and preparation, the use of a longitudinal dataset is motivated by both the call to always include group-level variation if warranted and possible (Gelman & Hill, 2007; Schmidt-Catran & Fairbrother, 2016), and the fact that we assume drug markets are dynamic. It is probable that a seller has a varying inventory, purchasing from different suppliers and such (Adler, 1993, for example, details the fluidity of exchange networks), and thus reducing the dataset to single product observations may introduce bias. For example, sellers may gain access to lower priced, or higher purity, products during their careers. In our treatment of data, we therefore estimate effects within the product for reputation and status, rather than the vendor, as is done in past research.

As highlighted in Section 6.1, there are concerns in online data collection that should be detailed. When estimating prices, and including reputation, key concerns are holding prices and the completeness of crawls (Munksgaard et al., 2016). Holding prices may cause unreliable estimates, whereas incomplete crawls may underestimate the amount of feedback a seller has received. The former was handled by qualitatively reviewing items which exhibited significant price discrepancies. Both markets showed all feedback left for an item, and to generate the reputation variables, the crawl in which most reviews were observed was selected as a point from which to discard all future observations of the product. This ensures that if a later crawl did not include a realistic amount of feedback due to incompleteness, the product observation was not used. Thus, observations with inconsistent feedback were dropped. In addition, a number of observations to which a credible price and quantity could not be specified were dropped (detailed in Chapter 7).

Finally, we develop what is, to our knowledge, the most detailed coding scheme in the study of online drug prices and provide it as an appendix. For each of the three substances, we include a categorical variable for a substance subclass, to better account for both the symbolic and cultural value assigned to some products (Beckert & Wehinger, 2013; Wendel & Curtis, 2000), the relative risk associated with them (L. Davis, 2011; Ouellet, Cagle, & Fisher, 1997), and their purity (Ben

Lakhdar et al., 2016; Reuter & Caulkins, 2004). This scheme was applied qualitatively after a machine learning classifier was used. Past research into online drug prices has, at best, included self-described potency (Červený & van Ours, 2019) or flagged products advertised as low quality (Przepiorka et al., 2017).

Thus, the paper prioritizes the use of "parallel data" (Bernardi et al., 2016; Carver, 1993), testing hypotheses under subset conditions. Consequently, if a variable, for example, the status assigned to a seller by the marketplace, exhibits similar direction, sign, and ideally, coefficient, that provides a stronger case for generalization (J. L. Davis & Love, 2019). Furthermore, we explicitly incorporate country-level variation (Schmidt-Catran & Fairbrother, 2016), and exploit some of the advantages of online data collection to use repeated measurements. The primary motivation of this comparatively complicated research design is the knowledge that drugs are unique and distinct products, and that drug markets are heterogeneous<sup>5</sup>.

### 6.3.2 Cooperation, active trust production, and experience

In the paper *Building a case for trust: Exchange relations and risk-taking in illicit online drug markets*, I examine whether buyers are inclined towards "putting more on the line" as they accumulate experience with a seller. This reasoning follows from the logic of the investment game, in which repeated exchanges are argued to produce trust (e.g. Glaeser et al., 2000). Thus, the paper builds on the hypothesis that repeated exchanges provide evidence of trust, which may motivate increasingly larger investments. Put alternatively, buyers make test buys, accumulate experience, and update their priors (Hardin, 1993). However, following from the discussion of active trust production, it is reasonable to anticipate that these also support risk-taking behavior (e.g., a contract reduces uncertainty). Thus, the conceptual model is that risk-taking is a function of active trust production and

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<sup>5</sup>We do not detail this in the article, but it is surprising that the papers by Espinosa (2019); Hardy and Norgaard (2016); Przepiorka et al. (2017) and Eschenbaum and Liebert (2019), despite their econometric approaches, do not cite the risks & prices framework.

experience. Concurrently with this work, Norbutas et al. (2020a) found evidence in support of this thesis, showing that return buyers return to sellers (see also Décary-Hétu & Quessy-Doré, 2017; Duxbury & Haynie, 2018a, 2018b; Norbutas, 2018).

Again, two markets are used to assess the replicability of the hypothesis (Carver, 1993; Schmidt-Catran & Fairbrother, 2016). Furthermore, a multilevel structure is assumed in which each transaction is nested within a seller, origin, category, and the buyer. This accounts for the fact that transaction size can be expected to vary across these groups and will therefore produce a more accurate estimate of the difference in risk-taking. Crawling is exploited in several ways in this study. First, two markets in which social ties can be measured are used, Abraxas and Silk Road 3.1. It is a rarity that cryptomarkets allow scholars to track repeated exchanges (Décary-Hétu & Quessy-Doré, 2017), and the Abraxas dataset is also used by (Norbutas, 2018; Norbutas et al., 2020a). Duxbury and Haynie (2018b) and Duxbury and Haynie (2018a) also use a similar dataset. The Silk Road 3.1 dataset, however, is novel and to date the largest dataset including repeated exchanges, though Duxbury and Haynie (2020) used a smaller sample from the market. Given the caution with which exchange data should be treated (Kruithof et al., 2016; Stinenbosch, 2019), I apply a validation check for each market exploiting additional data collected through crawling. This is a novel strategy not applied in previous studies, and yields similar results to Kruithof et al. (2016) and Stinenbosch (2019) in terms of coverage. In the paper, I address the problem of unmeasured exchanges, and *A change of expectations?* brings the problem to the fore: Cryptomarket buyers in the Global Drug Survey have on average made 11 cryptomarket purchases, a number that is beyond what I observe in the two markets, and what past research has documented as well (Duxbury & Haynie, 2018a, 2018b; Norbutas, 2018; Norbutas et al., 2020a). Finally, as feedback is observed continuously but products and sellers only observed at intervals (i.e. when a crawl is made), it was deemed appropriate to use a low-practical form of data imputation: If an exchange is observed on day 10, and the product and seller in question were observed on day

1 and 15, the values for escrow and status were set to the closest observation in time (the value at day 15). Reputation scores are more precise, as these are based on all observed feedback.

Given these limitations, some reservations are made, specifically about the effects of repeated exchanges. It is suggested that the extent of these is likely underestimated, which may have implications for parameter estimates. However, even with these reservations in mind, the hypothesis that buyers will tend to engage in larger transactions over time can be tested. Finally, during crawling, the DAT-ACRYPTO team discussed the validity of using data from Silk Road 3.1, which had a reputation for being untrustworthy, and possibly having an administration inclined to fraudulent practices (see also Moeller et al., 2017). However, based on my past predoctoral fieldwork, I had first-hand knowledge that the market was reliable (Martin et al., 2020).

### 6.3.3 Beliefs

The third paper, *A change of expectations? Generalizing trust in illicit online drug markets*, takes a radically different approach compared to the two preceding papers, which follow from past analyses of trust in illicit online markets (e.g. Lusthaus, 2012; Odabaş et al., 2017a; Przepiorka et al., 2017), or the criminological emphasis on cooperation (von Lampe & Johansen, 2004). Contrary to these, we hypothesize that experience not only informs interpersonal trust, but also abstract trust. Thus, the paper follows the experiential position among scholars of generalized and institutional trust (Carlsson et al., 2018; Sønderskov & Dinesen, 2016; Uslaner, 2008), and addresses the sociological and institutional perspective on trust as a state of favorable expectations produced by social integration (Luhmann, 1979; Misztal, 1996; Sztompka, 1999). It is the cognitive dimension of trust that is examined as a product of the behavior (Lewis & Weigert, 1985).

To test this hypothesis, we use survey data from the 2018 Global Drug Survey, GDS. The GDS is a separate project and constitutes the largest global survey of drug use and consumption (Barratt et al., 2017). My use of the GDS data con-

stitutes secondary use of already anonymized data, was supervised by the scholars who manage the survey, and thus received an ethical exemption from the Comité d'éthique de la recherche - Société et culture (CERSC). Past iterations of the GDS have been used to examine knowledge and use of cryptomarkets (Barratt et al., 2014), and drug market related risks of offline and online drug buyers (Barratt, Ferris, & Winstock, 2016). I was originally invited to replicate and extend the second paper on cooperation and risk using the GDS data, but observed that the data could be used to test this novel hypothesis if the appropriate strategy was applied.

In the survey, respondents were asked about their estimate of whether cryptomarkets would outperform their preferred source of illicit drugs, a dealer, or street market, in terms of value, purity, price, and weight. Thus, a question originally intended to survey the opinions of cryptomarket users could, approached appropriately, be used to test whether experience is conducive to not only risk-taking, but also beliefs, the cognitive estimate of trust. As discussed in Section 4.4, institutional and generalized trust are typically measured using standardized items from international surveys (e.g. Dawson, 2019; Hakhverdian & Mayne, 2012), though these may be criticized for their validity (Glaeser et al., 2000; Uslaner, 2008), and how wide the circle of trust extends (Delhey et al., 2011). The GDS items are more specific and do not use such a standardized format. While there are no established scales designed to measure institutional trust in illicit market institutions, the questions concern a general estimate about what can be expected from a demarcated group of actors relative to another group, and thus they address the cognitive aspect of trust (Lewis & Weigert, 1985). In turn, they are highly specific, which is recommended for survey questions about trust (Carlsson et al., 2018; McEvily et al., 2012). The measure may be criticized for whether it represents trust (see also Uslaner, 2008), but in doing so the discussion of the relation between the cognitive and behavioral dimensions must be revisited (see Section 4.4), rather than the specific phrasing of the questions. Thus, the paper rests on the assumption that self-stated relative expectations are a measurable proxy of trust in institutions and



groups.

Data on illicit markets, exchange therein, and the marginalized populations that may use drugs, is not easy to collect. Moreover, the representativeness of the data poses a serious challenge (Enghoff & Aldridge, 2019). The GDS is a cross-sectional survey advertised through national stakeholders, typically scholars and organizations. Representativeness can therefore not be assumed. Scholars have provided evidence that the GDS is representative (Barratt et al., 2017), but representativeness is not a necessary assumption of the research design applied in this study. The question assumes a causal relation, in which beliefs are updated or formed after experiencing a cryptomarket. Because the GDS is cross-sectional and respondents self-select into the "treatment" condition (using a cryptomarket), a potential causal relation cannot immediately be identified by design. In other words, while it is possible to measure beliefs among buyers and nonbuyers and compare them, the two groups have different compositions, and we do not know what beliefs the buyers held before using the cryptomarket.

To resolve this issue and make a suggestive case for a causal estimate, we apply propensity score matching (PSM), which we detail more in-depth in the article (see Berry, 2019, for a brief and concise introduction). PSM is a method for causal inference under the assumption that conditional on covariates treatment assignment is essentially random (Apel & Sweeten, 2010). Put simply, if we can create two similar groups of subjects, then the conditions of an actual experiment are approximated, and therefore the difference between the two groups corresponds to the treatment effect on those who have received the treatment (Apel & Sweeten, 2010, p. 547). With PSM, these groups are identified by calculating the probability, typically using logistic regression, of receiving the treatment (Stuart, 2010), in this case, buying drugs on a cryptomarket. Having matched the two groups, we compare the difference between them, and can thus pose a cautious case for causality under the premise that what separates these groups is having used a cryptomarket. The large sample size allow us to use a simple and intuitive version of PSM in which we match observations based on their nearest neighbor. The sample size

also allows us to discard any observation that has missing data, rather than using data imputation.

For the study, we again take advantage of the grouped data structure. First, recognizing that it is problematic to assume that the probability of using a cryptomarket is the same across countries (Barratt et al., 2014; Décary-Hétu et al., 2019; Dolliver et al., 2016), we use preferential within-group matching (Arpino & Cannas, 2016), matching 97.5% of the treated to untreated subjects within their country. Second, acknowledging that abstract trust varies across countries (Bjørnskov, 2007; Sztompka, 1999), and that the tendency towards purchasing domestic and regional products means buyers encounter different markets (Demant, Munksgaard, Décary-Hétu, & Aldridge, 2018; Munksgaard, Décary-Hétu, Malm, & Nouvian, 2020), we allow the treatment effect to vary across countries, similar to the example in Section 6.2.2. Recognizing the strength of using parallel data, we show estimates from two matching models, as well as estimates based on the entire sample.

Thus, the study uses a unique survey data set to test whether experience with the cryptomarket leads to a change of expectations at the abstract level. For this purpose, we exploit PSM in combination with multilevel regression. This allows us to estimate the difference in beliefs between a group of nonbuyers that is similar to the group of buyers across covariates.

#### **6.4 Where are the networks?**

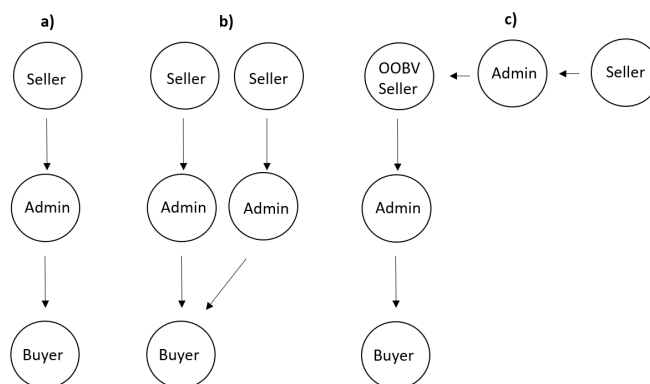
In Chapter 2 I highlighted how network structures are a key area of research in illicit markets (Moeller, 2018a). The relevance of networks for trust seem apparent given the discussion of trust in Chapters 4 and 5, and the centrality of trust to traditional analyses of networks in illicit markets (e.g. Bichler et al., 2017; Bouchard & Ouellet, 2011; Malm & Bichler, 2011; Malm et al., 2017). Within economic sociology, networks have historically been the primary object of empirical interest, although as discussed in Section 2.4 emphasis has waned in recent years (Granovetter, 2017). Yet, none of the research designs presented above, include networks in

their traditional form as is studied in social network analysis (e.g Bright & Delaney, 2013; Morselli, 2002; Morselli & Roy, 2008). Why is that, and where are the networks? In this section I explain this absence<sup>6</sup>. I begin by briefly summarizing the scholarship on networks in cryptomarkets. I then discuss the implications of my theoretical framework, which I suggest necessitates abandoning, or at least de-emphasizing the network as variable. I further argue that while absent as a structure, the functions of networks are in fact the central point of departure.

The principal challenge to analyzing cryptomarkets, and illicit online markets at large, as networks is the establishment of social ties between entities. In traditional analyses of social networks and crime, these ties may be based on co-offending, arrests, and wiretaps, for example (see Bichler et al., 2017, for review). Social network analysis has been applied in the study of forum type markets, wherein transactions, and cross-posting in threads may be considered ties (Décary-Héту & Dupont, 2013; Odabaş et al., 2017b). In the analysis of cryptomarkets, scholars have in a select number of cases been able to identify unique buyers, and create networks of buyers and sellers in which a tie is a transaction. Results from this strand of research are relatively consistent, finding that first-time buyers choose sellers based on reputation scores, but that buyers tend to return to them afterwards giving less weight to reputation (Décary-Héту & Quessy-Doré, 2017; Duxbury & Haynie, 2018a, 2018b). Notably, these findings are reproduced using statistical approaches not directly derived from a social network analysis framework (Norbutas et al., 2020a; Norgard et al., 2018). Norbutas (2018) further finds that choice of seller is strongly influenced by geographical origin, suggesting some very concrete barriers to international exchange (see also Cunliffe et al., 2017; Décary-Héту et al., 2016; Demant, Munksgaard, Décary-Héту, & Aldridge, 2018). Another area of research has drawn on studies of the robustness and disruption of illicit networks (see for example Bright & Delaney, 2013; Bright et al., 2019). For example, Duxbury and Haynie (2020)

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<sup>6</sup>In discussing networks, I discuss transaction or exchange networks, that is, networks between buyers and sellers based on exchanges. This is because it is the only application of social network analysis in cryptomarkets (Décary-Héту & Quessy-Doré, 2017; Duxbury & Haynie, 2018a, 2018b, 2020; Norbutas, 2018).



**Figure 6.4** – Exemplary exchange networks in an illicit online market. In all three administrators are intermediaries assuming the transaction is in escrow. While the administrator does not hold product, they still occupy a mediating position and are therefore included. a) First-time buyer. b) A buyer purchasing from two different sellers. c) An OOBV seller re-selling product.

and Duxbury and Haynie (2018a) specifically examine the robustness of exchange networks to different intervention strategies.

The social network approach to illicit online markets, namely cryptomarkets, is limited by the market structure itself which restricts the available network structures that can be collected data on. There are generally two roles, buyer and seller, and their exchanges are mediated by an administrator who operates the platform and offers escrow services (Odabaş et al., 2017a). Ideal typical networks derived from the research are shown in Figure 6.4. In each, buyers send money to sellers in exchange for goods. As a drug distribution network, these may be treated as directed ties along which products flow in exchange for money (Duxbury & Haynie, 2018b; Norbutas, 2018). In a) a first-time buyer purchases from a seller. In b) a buyer has purchased from one seller, and chooses another. These are the key components of the exchange networks examined in the literature. There are sellers who source product in cryptomarkets and then resell it, so-called OOBV (online-to-online-buyer-vendors, example c)). However, these are not observed outside qualitative research (Martin, 2018b). For example, Duxbury and Haynie (2018b) find no buyers operating as vendors. The cause of this is likely that sellers pur-

chase under other names to protect themselves<sup>7</sup>, or because the market simply does not allow a seller profile to purchase products. Rather, the typical pattern is that buyers purchase from one or more sellers. This pattern resembles two-sided platform markets in general (Rochet & Tirole, 2006). The implications of this market organization are very concrete with regards to network analysis. For example, brokers, actors who take on network positions where they are the only link between disparate components (e.g. retailers and wholesalers) are not traceable in a cryptomarket exchange network (Pearson & Hobbs, 2003). "Middle-men", OOBV, do exist (Martin, 2018b), but they are likely operating under alternate identities. Finally, these are not social networks in a traditional sense wherein social ties allow the propagation of information that is conducive to trust (e.g. Buskens & Raub, 2002; Ellickson, 1991; Malm et al., 2017). The organization of the market itself therefore limits the application of social network analysis.

The two-sided market structure, in which different sellers compete, and for which there is sparse evidence of OOBV sellers, would suggest that most sellers procure product from wholesalers external to the platform (Aldridge & Décary-Héту, 2016; Demant, Munksgaard, & Houborg, 2018; Dittus, Wright, & Graham, 2018). Consequently, the scenario might be so that all four sellers who, in the example, sell products on a cryptomarket in fact have the same wholesale source. Each seller may be considered a "firm" (Paquet-Clouston et al., 2018), consisting of either one or multiple individuals (Martin et al., 2020); small networks as is observed in drug markets typically (e.g. Bichler et al., 2017; Bright & Delaney, 2013; Malm & Bichler, 2011). In this sense, each seller profile is already embedded in a pre-market network in which producers, wholesalers, retailers, distributors, and traffickers are all roles that are connected through exchanges. Some of these exchanges likely take place in cryptomarkets (Martin, 2018b; Martin et al., 2020), but presently it is not possible to trace them. Rather, the organization resembles a street market, more than it resembles a network (Aldridge & Décary-Héту, 2016;

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<sup>7</sup>Should a seller purchase from another seller, they will be giving away crucial information, namely the address to which the product is shipped. Drop locations not associated with the seller would be a strategy to minimize risk if one made such a purchase.

May & Hough, 2004). Drawing a historical analogy, Tilly's (2005) concept of covert trust networks, such as pirates, provides an analogy for this structure. Trust networks operate in relation to states or powerful entities. While all actors in the market by definition operate in opposition to the state, as discussed in Chapter 2, they also exist in a "patronage" or "clientage" relation to the market administration. In this sense, the firm is a privateer, one trust network among many (Tilly, 2005, p. 83).

The absence of networks as a statistical representation also follows from the theoretical and analytical framework I have presented. The transition to capitalism and modernity, which I have argued is analogous to the difference between premodern exchange structures of illicit markets and cryptomarkets, specifically highlights the erosion of social networks and informal social control which are functionally replaced by modern institutions and formal social control (Black, 1976; Zucker, 1986). As Polanyi (2001) argues, the distinction between modern and premodern economies is the development from an economy embedded in social relations to social relations being embedded in the market (see also Beckert, 2003; Krippner, 2001). This has concrete implications for the mechanisms which networks generally stand in for; belonging to a community, social control, and reputation. Networks are trust producing but the causal processes should be separated from social structure at this meso-level. Notion of trust as produced in networks hinge on more fundamental assumptions, namely experience, the transitivity of trust, worlds in common, and social control. A distinction must therefore be made between the network as a concrete object of analysis (i.e. social relations), and the network as the domain of causal processes and mechanism.

As discussed in Section 4.3.2, networks facilitate trust through learning and control (Buskens & Raub, 2002). These may also be considered as reputation and informal social control (Ellickson, 1991; Moeller & Sandberg, 2017). At the level of the dyad, the buyer can ostracize a seller (control), and acquire more information on their honesty (learning). In a social network these functions can be generalized, as the propagation of information allow others to ostracize a deviant or learn more

about an honest person (Denton & O'Malley, 1999; Glückler & Armbrüster, 2003). In the conceptual model I have developed, interpersonal trust is based on the dyadic level of these processes, because experience generates a level of expectation on the other (interpersonal trust). As argued in Section 4.3.2, the value of reputation is moderated by the transitivity of trust, the capacity to trust some above others due to social relations (Glückler & Armbrüster, 2003). Because the reputation system is not a conduit for the transmission of reputation that can be discriminated based on social relations it is untenable to conceptualize it as networked reputation. This is echoed in most studies, which refer to reputation systems (Hardy & Norgaard, 2016; Norbutas et al., 2020a; Przepiorka et al., 2017), or trustworthiness (Duxbury & Haynie, 2018a, 2018b). Instead it is a centralized repository of information which is trust producing. It may still promote learning and control effects (Norbutas et al., 2020a), but it does not take a networked structure in the sense of a social network.

The control/learning dichotomy is not adequate for illicit markets, because informal social control is more complex than ostracization and reputation (e.g. Dickinson, 2017; Moeller & Sandberg, 2015, 2017). I argued in Section 3.2.2 and Chapter 5 that this social control is functionally replaced by the administration of cryptomarkets. Typically, informal social control hinges on relations in order to, for example, make threats (Black, 1990; Ellickson, 1991). When informal social control is functionally replaced to an unprecedented degree in illicit markets, the relevance of network structures therefore diminishes. Finally, embeddedness in networks is not only a question of social ties, but also a world in common, shared norms, and ties based on, for example, ethnicity that do not necessitate pre-existing relations (e.g. Bourgois, 2003; Schoenmakers et al., 2013).

That the network stands in for these functions, informal social control, reputation, and belonging to a shared community, is one of the points raised by Granovetter (2017) in his encouragement to de-emphasize networks. When the network is dissected into functions, the power and explanatory of social networks is not disregarded, rather, all the functions I argue are crucial to the production of trust are

those that criminologists stress produce trust through networks (Malm et al., 2017; Moeller, 2018a; Schoenmakers et al., 2013; von Lampe & Johansen, 2004). If these are dissected, the conceptual model is indeed derived from the network, but the network is not the empirical representation. Furthermore, the conceptual model of trust production I have proposed is in accord with the findings of social network studies, which have reliably shown that first-time buyers choose sellers with high reputation.

## 6.5 Summary

Within this chapter, I have detailed the data collected and used for the three articles, and sought to highlight the methodological approach shared between them. Rather than focusing on the technical details of data collection, which as described are relatively simple, I have instead highlighted some of the potential issues associated with online data, not only in terms of reliability, but also their validity, what can and cannot be captured with crawling and scraping techniques. Specifically, I highlighted the problems associated with capturing two central themes in the literature on trust, social ties and beliefs, drawing a parallel to the social construction of the cryptomarket as a socially atomized market order.

Moving beyond this, I introduced themes that are consistent throughout the empirical work, the problem of online data and generalization (J. L. Davis & Love, 2019; Enghoff & Aldridge, 2019). I highlighted the utility of specifying how some mechanisms and social processes should work, according to theory, and how choices concerning data and the presentation thereof can support these claims of knowledge. Practically, I drew attention to putting less emphasis on  $p$ -values, instead highlighting replicability using parallel data, and presenting results as concrete estimates, namely price and transaction sizes (Bernardi et al., 2016; Carver, 1993). I then proceeded to introduce the main statistical method applied, multilevel linear regression, showing how a failure to account for group structure in data can severely undermine the validity of knowledge claims. I then concluded the chap-



ter by situating each of the three articles along these concerns, and discussing the absence of social networks as a central methodological concept.

The methodological approach I take is the logical conclusion of the synthesis I have sought to build between the criminology and economics of drug markets, and the economic sociological approach. This combination reveals some interesting gaps in the literature. For example, our paper on price formation is only the second to explicitly account for country-level variance in drug prices when studying reputation (Červený & van Ours, 2019; Eschenbaum & Liebert, 2019; Espinosa, 2019; Przepiorka et al., 2017), despite an extensive criminological body of literature that documents varying quantity discounts and prices (e.g. Caulkins, 2007; Caulkins & Padman, 1993; Caulkins & Reuter, 2006; Cunliffe et al., 2017; Reuter & Kleiman, 1986; Smart et al., 2017). Similarly, the choice to use survey data follows from the critique I developed of an overemphasis on cooperation within criminology (von Lampe & Johansen, 2004), and it is surprising how little attention has been paid to this aspect of trust in the literature. However, the central causal process of experience accumulation I suggested in Section 5.2 also makes apparent that a simple comparison of means is not a plausible strategy to examine these. Thus follows the use of propensity score matching.

The practical dimension of the methodological choices I make will moderate the conclusions that can be drawn from the following articles. In fact, mechanisms deemed central in the literature, namely, escrow and reputation (Odabaş et al., 2017a; Przepiorka et al., 2017), seem less decisive when parallel data is used. Nuance will be added as a consequence of my choices, and the casualty will be grand claims of singular mechanisms as conducive to trust, when group structures and drug market dynamics are accounted for, and when cents and dollars take precedence over significance stars. However, I will also show that trust is a complex social process, irreducible to static structures, and contingent on the accumulation of experience.

## CHAPTER 7

### UNCERTAINTY AND RISK: HOW ACTORS SET PRICES IN ONLINE DRUG MARKETS

*This paper is co-authored by Meropi Tzanetakis<sup>1</sup>. The paper is currently pending submission.*

#### **Abstract**

The pricing of illicit drugs is typically approached from a transaction cost perspective through the risks and prices framework. Recent sociological and economic studies of online drug prices, however, have stressed the centrality of reputation for price formation. In this study, we propose an account of price formation that integrates the two and further incorporates the informal social control exercised by administrators.

We apply our model to estimate the prices of cannabis, cocaine, and heroin in two online drug markets ( $n = 92.246$ ). Using multilevel linear regression, we assess the influence of product qualities, reputation, payment methods, and status devices on price formation.

We observe extensive quantity discounts varying across substances and countries, and find premia and discounts associated with product qualities. We find evidence of payment method price adjustment, but contrary to expectation we observe conflicting evidence concerning reputation and status. We assess the robustness of our findings concerning reputation by comparing our model to previous approaches and alternative specifications.

We contribute to an emerging economic sociological approach to the study illicit markets by developing an account of price formation that incorporates cybercrime scholarship and the risks and prices framework. Prices hold relevance for both

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policy and theory, and we argue that an interdisciplinary approach can elucidate both the organization and economics of online drug markets.

## 7.1 Introduction

The study of drug prices has traditionally been ceded to economists (Bushway & Reuter, 2008), but recent incursions by criminologists and sociologists have begun to stake out unique contributions (Moeller & Sandberg, 2019). From this perspective, the study of prices can elucidate the social organization of illicit markets (Beckert, 2011). In this paper we pursue this development by studying how sellers set prices in online drug markets, a unique institutional context that offers contracts, formalized sanction, and dispute resolution (Bakken et al., 2018; Diekmann & Przepiorka, 2019; Moeller et al., 2017).

Illicit online drug markets, hereafter cryptomarkets (Martin, 2014b), have in recent years become both part of popular culture and an integrated component of the global drug trade. They primarily supply retail drug markets, the "last mile" of drug distribution (Demant, Munksgaard, Décary-Héту, & Aldridge, 2018; Dittus et al., 2018). Essentially, cryptomarkets are illicit platform economies and function like online platforms such as eBay or AirBnB with the principal distinction being the legal status of products (Martin, 2014a). Their state of "open secrecy" (Ladegaard, 2020), in which the platform is anonymous but open to buyers and sellers (Aldridge & Décary-Héту, 2016), has attracted economists and sociologists in addition to criminologists (see Martin et al., 2019, for an overview). More generally, cryptomarkets are one manifestation of a growing trend in which actors adopt digital tools to facilitate the distribution of illicit goods and services (see for example Demant et al., 2019; Hutchings & Holt, 2015; Odabaş et al., 2017b; Soska & Christin, 2015).

Prices are relevant for drug- and crime control policy and theoretically interesting (Moeller & Sandberg, 2019). Traditionally, drug prices are approached within the risks and prices framework. Here, price is considered a function of policing which increases transaction costs and adds a "risk tax" (Reuter & Kleiman, 1986). Within the study of illicit online markets, scholars have emphasized the centrality of reputation systems to price formation, and research has documented reputation

premiums (Espinosa, 2019). These findings have been argued to constitute evidence of a state of "order without law" or "spontaneous order" (Hardy & Norgaard, 2016; Przepiorka et al., 2017). However, the assumptions that undergird the reputation literature do not correspond to how criminologists conceive of illicit markets, who instead emphasize the productive function of the state and the regulating function of informal social control.

In this paper we propose a framework for understanding price formation in on-line drug markets by combining three strands of the literature. We draw on the risks and prices framework, the criminological literature on illicit online markets, and studies of reputation in illicit online markets. We argue that a set of uncertainty reducing social processes support the valuation of goods in these markets, but that price formation is constrained by the formal institutional setting of drug enforcement (Moeller & Sandberg, 2019). We argue this approach is both more enlightening with regards to the social organization of illicit online markets, and that it is utile for producing policy relevant research.

In the following three sections we present our theoretical approach which combines sociological, economic and criminological perspectives on illicit markets. Hereafter we summarize our model of price formation. We then present data, analytical approach, and the analysis. We conclude the paper with a discussion.

## **7.2 Institutions and the formation of prices**

Research on drug markets and prices has been shaped by the risks and prices framework, which argues that risk is a "tax" levied onto each transaction (Reuter & Kleiman, 1986). Market actors in the drug economy are compensated for the relative risk from both law enforcement (e.g. incarceration) and peers (e.g. fraud). Consequently, the price of drugs is often higher than gold or silver (Reuter & Caulkins, 2004). Drug prices are therefore a function of state induced risk towards market actors. Moeller and Sandberg (2019) argue that the risks and prices approach is compatible with institutional strands of economic sociology, which high-

light the role of the state in producing "stable worlds of exchange" (Fligstein, 1996, 2001). Contrary to licit markets, however, this relation is inversed, and the state actively produces disorder through the absence of regulation, courts, and contracts, and its enforcement of law (Beckert & Wehinger, 2013). Structurally, drug prices are observed to vary extensively across and within countries (Reuter & Caulkins, 1998; Reuter & Kleiman, 1986). Boivin (2014) argues this is a function of border enforcement and interdiction, which lead to both product seizures and increased risk of arrest. Adler's (1993) classical ethnography of upper-level drug dealing, for example, shows that the import stage of trafficking is both a specialized and risky endeavour, which in turn explains the mark ups in price. In illicit online markets, significant differences have been found between Australian and international prices, which are argued to be a consequence of importation risks (Cunliffe et al., 2017). Similarly, risk differentiation has been argued to produce varying quantity discounts between drugs sold on cryptomarkets and social media in Sweden (Moeller, Munksgaard, & Demant, 2020).

Scholars studying the role of reputation in price formation in online drug markets depart from a different conception of the state. Rather than emphasizing that the state shapes illicit markets, its absence and non-interference is the basic assumption. Hardy and Norgaard (2016) argue that cryptomarkets provide evidence that "the principles of an unfettered market rooted in reputation and accountability can be applied to an extremely vast array of goods and services", and that "[like] the Law Merchant, they demonstrate how a marketplace, where feedback mechanisms and reputation are the only things keeping the market functioning, can exist without government regulation". (p. 517) Both Hardy and Norgaard (2016) and Przepiorka et al. (2017) make reference to the medieval law merchant Milgrom et al. (1990) which in the absence of any state support maintained cooperation through reputation and mediation (see also Swedberg, 2003, p. 200).

These two perspectives therefore differ in how they conceive of the role of the state. The state may be seen as absent, making these markets exemplar of the potential of social order to emerge through self-interest and -regard, or it may be

seen as the root of disorder. The difference is that the latter perspective operates under the assumption that drug prices are predominantly a function of enforcement.

### 7.3 Informal institutions and price

Non-state actors and institutions, such as gangs (Levitt & Venkatesh, 1998), or the Mafia (Reuter, 1984), can support stability in illicit markets through sanction, informal social control, and dispute resolution (Beckert & Wehinger, 2013). For example, the insurgent group FARC-EP instituted price control on drug trafficking in its territories (Gutiérrez D. & Thomson, 2020). In illicit online markets, Odabaş et al. (2017a) argue that administrators support exchange and stability through authentication and mediation. Mediation consists of dispute resolution and escrow systems. Authentication is provided through product verification and the ranking of sellers (Dupont et al., 2017). Within the reputation literature, the focus is on the reputation system as a stabilizing institution, beyond which power and control are not really discussed (Hardy & Norgaard, 2016; Przepiorka et al., 2017). An exception is Diekmann and Przepiorka (2019) who suggest "contract law" is operational through mediation practices. Conversely, the criminological position highlights the centrality of administration to the establishment of stable worlds of exchange: Lusthaus (2012) argues administrators are crucial to the production of trust and order, Dupont et al. (2016) remark on the fact that servers remain under administrative control, and Odabaş et al. (2017a) suggest that illicit online markets are found on a continuum of governance (see also Bakken et al., 2018; Wehinger, 2011; Yip, Webber, & Shadbolt, 2013). Within this approach, reputation systems are merely one of several mechanisms that support exchange and stability. Thus, there are two different perspectives on the internal governance of markets and the power relations within platforms.

We draw attention to the control exercised by administrators of illicit online markets, which is qualitatively different to that which supports traditional illicit markets (Moeller, 2018a). J. Griffiths (1984) argues that the strict informal/formal

social control distinction can be conceived of as varying degrees of "legalness". The complexity of the division of social control labor is an expression of such legalness. In illicit online markets social control takes on such "legal" qualities by standardizing contracts and dispute resolution (Diekmann & Przepiorka, 2019), and a division of social control labor exists between market participants, moderators, and administrators. Administrators hold "settlement" capacities, meaning they can arbitrarily decide on the outcome of a dispute (Black, 1990). This qualitative difference is illustrated by the relatively frequent expropriation of virtual currencies from sellers and buyers by administrators (Moeller et al., 2017), something that is beyond the capacities of the law merchant (Milgrom et al., 1990). Thus, from the perspective of informal social control in illicit markets, the administration holds capacities that are qualitatively different than what is typically observed in illicit markets (Jacques & Wright, 2011; Reuter, 1984).

#### **7.4 The production of certainty**

In the preceding sections we have suggested that prices in online drug markets are constrained by the formal institutional context, but supported by distinct internal mechanisms. By enforcing prohibition, the state increases the risk for market actors, the institutional constraint on prices. Within these constraints marketplaces offer a set of socio-technical "devices"; escrow systems, status hierarchies, and reputation systems. These reduce uncertainty about cooperation and product quality by establishing track records and reducing the scope of potential opportunism (Schilke et al., 2016). Sellers can leverage these in competition with each other (Bakken et al., 2018; Beckert & Wehinger, 2013). Zucker's (1986) notion of the institutional production of trust through contracts, courts, and regulation is informative, and we suggest conceiving of the capacities of administrations as such.

Absent state regulation and product standardization the valuation of illicit products is predominantly a problem of estimating their quality (Beckert & Wehinger, 2013). Illicit drugs are unique products: Purity does not necessarily cor-



relate with perception and experience (Bancroft & Reid, 2016; Ben Lakhdar, 2009), they pass through multiple intermediaries who can dilute them (Adler, 1993; Broséus, Gentile, & Esseiva, 2016), and sellers may not have perfect information about their product (Reuter & Caulkins, 2004). Product uncertainty is not intrinsic to drugs, but a consequence of drug enforcement and the lack of regulation (Beckert & Wehinger, 2013; Fligstein, 2001). By extension, the absence of courts and contracts provides ample room for opportunism (Jacques et al., 2014; Naylor, 2003). In traditional illicit markets, these problems of opportunism and product uncertainty are resolved through social norms, by embedding transactions in social relations, and through informal social control (Moeller, 2018a).

Illicit online drug markets are socially disembodied spaces by design wherein actors are strangers to each other, anonymous, and locally unbound (Norgard et al., 2018). The provision of informal governance and support for stable exchange relations may therefore be conceived of as "functional replacements" to the mechanisms that govern traditional illicit markets (Luhmann, 1979). Following conceptualizations within the cybercrime literature, we identify three elements that are operational in cryptomarkets; status hierarchies, reputation systems, and escrow systems (Odabaş et al., 2017a). This repertoire of socio-technical "devices" and social control labour supports both product and seller certainty and promote a stable environment for competition (Beckert, 2009). Except for reputation, these are generally under-scrutinized empirically, and we briefly discuss each.

### **Reputation systems**

Reputation systems allow buyers to rate and comment a seller and product, typically using a 5-star scale (Martin, 2014b). Functioning as an informal institution, the law merchant appears as an apt analogy as suggested by the reputation position (Hardy & Norgaard, 2016; Przepiorka et al., 2017). However, it cannot be immediately compared to reputation in traditional illicit markets. Reputation systems provide socially disembodied information without social networks and peers (see for example Denton & O'Malley, 1999; Dickinson & Wright, 2015). Reputation

systems are therefore best conceived of as "public", rather than "networked", reputation (Glückler & Armbrüster, 2003). Further, the reputation system is under hierarchical control, leaving room for opportunism (Dow, 1987), and centralized sanction (Dupont et al., 2016). In this sense, reputation systems are provided, rather than a function of social interaction (Odabaş et al., 2017a).

Przepiorka et al. (2017) observe that sellers respond to positive reputation by increasing prices and decreasing it on negative feedback. Hardy and Norgaard (2016) analyze cannabis prices in the US but does not observe parameter estimates consistent with the thesis. Espinosa (2019) observes a tendency in the expected direction, but not all parameter estimates are insignificant and/or in the opposite direction. Finally, Červený and van Ours (2019) find no effects of positive feedback. As such, whereas reputation systems are generally observed to influence price in licit online markets (e.g. Diekmann et al., 2014; Dimoka et al., 2012; Resnick, Zeckhauser, Swanson, & Lockwood, 2006), there is limited quantitative evidence from online drug markets with regards to prices.

### **Status hierarchies and authentication**

Administrators exercise what Odabaş et al. (2017a) denote authentication. For example, by vetting sellers or requiring bonds. They may also rank them by status, verify them or their products (e.g. "trust level 7", "trusted seller", Tzanetakis, 2018b). These are derived from performance (i.e. calculated on the basis of reputation scores or other performance metrics), but there is a qualitative difference: Trust can be transferred because a third-party assigns this status (Glückler & Armbrüster, 2003). The administration promotes "calculativeness" by authenticating sellers (Odabaş et al., 2017a), collating, collapsing, and reducing the necessity to make exhaustive calculations by pouring over reviews (Muniesa et al., 2007). This creates a status hierarchy (Podolny, 1993) and allows for another level of differentiation between sellers.

Authentication is under-scrutinized in the study of online drug prices in comparison to reputation. In cryptomarkets, Décary-Hétu and Quessy-Doré (2017)

find they are not associated with loyalty towards sellers. In stolen data markets, authentication of sellers has been found to be associated with price (Holt, 2013), cooperation (Odabaş et al., 2017b), and reputation (Décary-Hétu & Dupont, 2013). In licit online markets, the assignment of a distinct status such as a Super Host status on AirBnB has been found to yield premiums (Ert, Fleischer, & Magen, 2016). Similarly, Dimoka et al. (2012) documents premiums on third-party verification in online markets for used cars. Thus, while there is evidence of the productive function of administration through authentication in licit online markets, there is inconclusive evidence in illicit ones.

### **Escrow and mediation**

Cooperation in illicit online markets is complicated by the anonymity of actors, the absence of social networks conducive to social control, and the fact that product cannot be inspected before purchase (Bakken et al., 2018; Moeller et al., 2017; Morselli et al., 2017). Escrow systems mitigate the uncertainties introduced by the increased probability of opportunism. These are informal institutionalized standards (Tzanetakis, 2018b), and three ideal typical payment modes may be differentiated; centralized, decentralized, and advance payment. The first involves the administrator as mediator who takes possession of funds. The second, also known as multisignature escrow, distributes three keys to administrator, buyer, and seller, and funds can only be released using two keys. This mitigates the risk of administrators absconding with funds (Ladegaard, 2020). Finally, buyers may choose to send payment in advance, colloquially known as "finalize early", FE. Evidently, the first and third come with distinct risks of opportunism as either administrators or sellers may choose to defect (Moeller et al., 2017; Morselli et al., 2017). The second, on the other hand, introduces technical complexity which increases labour costs (Tzanetakis, 2018b).

Diekmann and Przepiorka (2019) compare escrow to contract law, and it is generally seen as a support of exchange relations in illicit online markets (e.g. Bakken et al., 2018; Moeller et al., 2017; Zajácz, 2017). Escrow systems are in

wide use across different illicit online markets, but there is sparse research on price and payment methods. One exception is Holt (2013), who find that some variation in the price of stolen data can be explained by transaction modes.

### **A model of price formation in illicit online markets**

We have suggested that prices in online drug markets are a function of external institutional constraint and internal institutional support, of which the latter is a functional replacement to the traditional resolutions to cooperation problems in illicit markets (Beckert & Wehinger, 2013). This conceptualization brings together the established literature on the determinants of drug prices (i.e. risks and prices), and incorporates insights from the literature on illicit online markets concerning the governance of platforms.

We propose that drug prices in cryptomarkets, and illicit online markets more generally, are shaped by two structures. Externally, drug policy and -enforcement adds a "risk tax". The degree to which these factors influence prices cannot be assumed to be static. Rather, they develop dynamically in relation to legislation and enforcement which vary across place and time (Beckert & Dewey, 2017a; Naylor, 2003). The same risk tax, for example, is not levied on Colombian cocaine as that sold from Europe (Boivin, 2014). However, a drug like cannabis in its herbal form, which is frequently produced domestically, can be assumed to vary less (Decorte & Potter, 2015). The principal assumption of our model is therefore that external forces shape prices, which will manifest in between-country and within-country variation in drug prices and quantity discounts. Following Moeller and Sandberg (2019), we refer to this as the institutional constraint. Internally, product and seller certainty are supported by a set of actively trust producing institutional features; escrow, dispute resolution, reputation, and status hierarchies (Zucker, 1986). These may be thought of as socio-technical "devices" (Muniesa et al., 2007). This secondary component is grounded in analyses that have highlighted the productive function of administration, and it builds on empirical findings from the reputation

position. However, it diverges from the notion of spontaneous order or order without law, by recognizing the complex division of social control labor and the power held by administrators.

Thus, we propose that *uncertainty reducing social processes allow sellers to charge a premium, but that the primary determinant of price remains the formal institutional constraint*. The first component extends the literature drawing on the criminology of illicit online markets, while the latter is based on the risks and prices framework.

#### **7.4.1 Research design**

We test our model by analyzing how sellers value their products (i.e. set prices) as they attain higher status, receive feedback, and utilize escrow or advance payment. Following our model, we seek to capture both the internal and external determinants of price. An adequate statistical approach should therefore account for **a)** the external variation of drug prices (i.e. between sellers and countries), and **b)** how sellers respond to changes in their reputation, status, and their use of escrow. We use data from two online drug markets and analyze three different drugs building replication into the design (Carver, 1993). To estimate the influence of institutional constraint we apply multilevel hierarchical regression. To produce estimates of how sellers respond we exploit repeated measurements of individual products. In the following sections we detail this design.

#### **Statistical analysis**

Central questions in the economic study of illicit markets and drug prices are purity-adjusted prices, price elasticity, and quantity discounts (Bushway & Reuter, 2008). Typically, scholars examine markets within similar institutional constraints. For example, Smart et al. (2017) analyze legal cannabis prices in Washington, and Caulkins and Padman (1993) estimate quantity discounts within the US. These questions are generally assessed using regular OLS regression or fixed effects regres-

sion. A standard model for estimating drug prices is to consider price-per-gram as a function of quantity, typically a linear model in which the log of price-per-gram is a function of log quantity (Caulkins & Padman, 1993). This accounts for discount elasticity, hereafter quantity discount, the tendency to discount larger quantities (Moeller & Sandberg, 2015). This model is applied in online and offline drug markets (e.g. Ben Lakhdar, 2009; Cunliffe et al., 2017; Moeller et al., 2020).

Online drug prices differ from traditional data sources. First, there is only vendors' self-reported data on purity (Červený & van Ours, 2019). Second, prices are set under different institutional constraints (i.e. countries). Third, prices are provided by individual sellers, a more granular source of data than e.g. national databases like the *System to Retrieve Information from Drug Evidence*, STRIDE (Caulkins & Reuter, 1996). However, this poses two unique problems; seller heterogeneity and product heterogeneity, since sellers may have access to different and dynamic drug sources (Adler, 1993). Fourth, repeated data collection can provide longitudinal data sets (see for example Martin et al., 2018; Tzanetakis, 2018a).

If the aim is to examine effects on one level, for example whether sellers adjust prices based on reputation (Przepiorka et al., 2017), the fixed effects approach can be sufficient in combination with longitudinal data to make a stronger case for causality while accounting for heterogeneity (Bushway & Reuter, 2008). However, this limits the analysis of structural components, namely between-country variation. We therefore apply multilevel linear regression, also known as hierarchical regression, or mixed effects regression. Here, population-level estimates (fixed effects) and group-level coefficients (random effects) can be estimated (Gelman & Hill, 2007). With sufficient data, the random effects allow the estimation of separate intercepts (price of 1 gram), and quantity discounts, for every country. With longitudinal data, it is further possible to estimate within-item effects of our key variables.

We apply multilevel linear regression to estimate price-per-gram in extension of our model of drug prices and the discussion of the unique data source. Based on the concept of institutional constraint, we assume drugs have varying discounts across

sellers, substance, and country. We estimate models for each drug, nest prices in sellers and countries, and allow a separate quantity discount (random slope) for countries when possible. At the internal level, we seek to estimate whether sellers respond to uncertainty reducing socio-technical practices when setting prices (i.e. status, reputation, and escrow). To account for item heterogeneity, we measure within-item effects. This means we observe the price-per-gram of a product listing under varying conditions of escrow, status, and reputation. Previous research has estimated within-seller effects (Červený & van Ours, 2019; Espinosa, 2019,?; Przepiorka et al., 2017), but the assumption of item heterogeneity (i.e. that a seller may have changing supply) can introduce a bias if longitudinal measures are used.

## Data

We use data from two cryptomarkets, Empire Market (from June 2018 to January 2020) and Silk Road 3.1 (from May 2018 to December 2019). These were collected as repeated measurements of products, sellers, and feedback, using webcrawling and -scraping methods as part of the DATACRYPTO project (Décary-Hétu & Aldridge, 2015).

Each platform presents a unique and complimentary institutional context. While Silk Road 3.1 was relatively small, Empire grew from negligible in size to large over the data collection period. Both platforms offered sellers the possibility to require different payment methods. Silk Road 3.1 introduced an additional option, finalize early (50%), which allows the seller to receive 50% of the payment in advance with the remainder being held in escrow. We analyze three substance types, herbal cannabis, heroin, and cocaine. These are among the most traded substances (Tzanetakakis, 2018a), provide sufficient grounds for statistical analysis, and increase the potential for generalization. Ideally, we would expect, for example, reputation premiums to manifest in all scenarios (three drugs, two markets) to make a strong claim to a generalizable effect (Carver, 1993; J. L. Davis & Love, 2019).

An initial machine-learning classifier was applied to classify advertisements into categories (Demant, Munksgaard, Décary-Hétu, & Aldridge, 2018) after which cod-

ing of substance, weight and subclass was qualitative. We aimed to create categories and subclasses within which products were comparable across weight and price. This necessitated the establishment of exclusion criteria and a comprehensive coding scheme. Research on valuation of illicit drugs online is sparse on these aspects, and therefore we include a comprehensive discussion of how we constructed the dataset as an appendix<sup>2</sup>.

## Variables

Our key variables are reputation, status, and escrow. We further control for product potency by separating subclasses of drugs (Ciccarone, 2009; ElSohly et al., 2016). This also provides an easily graspable comparison to the relative strength of effects for escrow, reputation and status (Bernardi et al., 2016). Table 7.I shows descriptive statistics for the dataset. We calculate price-per-gram incorporating the minimal advertised shipping cost. The labeling and justification of drug subclasses is detailed in the appendix. It is based on product differentiation which typically reflects potency, but we also highlight the relative cultural meanings and value of products (see for example Wendel & Curtis, 2000). We discuss these as we present the results.

Both markets offer status devices, for which we use vendor trust level and vendor level which are status rankings in the two platforms. For each observation these are set based on the closest observation of the seller (see also Demant, Munksgaard, Décary-Hétu, & Aldridge, 2018). While both marketplaces did offer sellers to require either of the three payment modes, the predominant mode on Empire was centralized escrow while on Silk Road 3.1 all three were in use. As advance payment was used infrequently on Empire (0.0%-0.5% of listings), these items were excluded from analysis. Different measures of reputation are used throughout the

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<sup>2</sup>The appendix presents a replicable protocol, which can be modified and extended. We highlight some significant practical challenges that remain unaddressed in the literature, concerning **a)** defining substances, **b)** specifying weight, and **c)** deciding on the appropriate way to measure price. The decisions we make in the establishment of this protocol are informed by the literature on drug markets and drugs as distinct products.



	Cannabis		Cocaine		Heroin	
	Empire	Silk Road 3.1	Empire	Silk Road 3.1	Empire	Silk Road 3.1
N	43184	6132	23295	7051	9069	2921
log(Price per gram)	2.18 (0.51) (-0.42 – 3.98)	2.18 (0.52) (0.45 – 3.89)	4.19 (0.46) (1.11 – 6.31)	4.13 (0.36) (2.07 – 5.76)	3.94 (0.86) (1.13 – 6.91)	3.52 (0.57) (2.08 – 5.48)
log(Weight in grams)	2.76 (1.71) (-1.61 – 10.13)	2.73 (1.69) (-0.120 – 9.21)	1.46 (1.74) (-3.91 – 8.01)	1.60 (1.72) (-2.30 – 6.91)	1.26 (1.72) (-2.30 – 6.91)	1.94 (1.80) (-2.30 – 6.91)
Inactive item (%)	18615 (43.1)	2634 (43.0)	10861 (46.6)	2667 (37.8)	3735 (41.2)	1292 (44.2)
Subclass (%)						
Afghan					4588 (50.6)	2089 (71.5)
Asian					1237 (13.6)	61 ( 2.1)
B.T.H.					626 ( 6.9)	140 ( 4.8)
Legal brand	661 ( 1.5)	27 ( 0.4)				
Outdoor	1798 ( 4.2)	182 ( 3.0)				
Regular	40009 (92.6)	5905 (96.3)	21314 (91.5)	6625 (94.0)	2210 (24.4)	577 (19.8)
Sample/intro/promo	716 ( 1.7)	18 ( 0.3)	1133 ( 4.9)	290 ( 4.1)	408 ( 4.5)	54 ( 1.8)
Social			848 ( 3.6)	136 ( 1.9)		
Crack (%)			2546 (10.9)	694 ( 9.8)		
Escrow (%)						
Finalize early (100%)		1022 (16.7)		2283 (32.4)		945 (32.4)
Finalize early (50%)		563 ( 9.2)		737 (10.5)		218 ( 7.5)
Full escrow	38335 (88.8)	4547 (74.2)	22390 (96.1)	4031 (57.2)	8959 (98.8)	1758 (60.2)
Multisignature escrow	4849 (11.2)		905 ( 3.9)		110 ( 1.2)	
log(Vendor level)		1.85 (0.73) (0.00 – 2.94)		2.06 (0.75) (0.00 – 3.00)		2.09 (0.66) (0.00 – 3.00)
log(Vendor trust level)	0.88 (0.77) (0.00 – 2.30)		0.96 (0.78) (0.00 – 2.20)		1.00 (0.75) (0.00 – 2.08)	
log(Positive seller ratings)	4.50 (1.98) (0.00 – 9.23)	4.64 (2.04) (0.00 – 8.28)	4.73 (2.00) (0.00 – 9.23)	5.24 (2.07) (0.00 – 8.28)	4.95 (1.75) (0.00 – 8.80)	5.53 (1.84) (0.00 – 7.97)
log(Negative seller ratings)	1.54 (1.35) (0.00 – 6.12)	0.95 (1.03) (0.00 – 4.23)	1.82 (1.40) (0.00 – 5.51)	1.58 (1.28) (0.00 – 4.46)	2.03 (1.35) (0.00 – 5.33)	2.18 (1.37) (0.00 – 4.64)

**Table 7.I** – Descriptive statistics. Mean, SD, and range for continuous variables. Count and percentage for categorical and binary. Log-transformed variables incremented by 1 when containing zero. Note that crack cocaine is not treated as a subclass but as a binary variable. This is to allow differentiation between a cocaine sample and a crack sample.

literature: lifetime measures (Nurmi et al., 2017), 0-100 ratings (Červený & van Ours, 2019), and product and seller ratings (Hardy & Norgaard, 2016; Przepiorka et al., 2017). Regardless of the measure, we anticipate that reputation encourages vendors to charge a premium, which should hold under all specifications. Thus, we use the log-transformed sum of negative and positive ratings of a seller over their lifetime as is the standard measure (Espinosa, 2019; Nurmi et al., 2017; Przepiorka et al., 2017). On Empire, reviews are labeled positive or negative, making this measure straightforward. On Silk Road 3.1, however, reviews are on a larger scale with values ranging from -48 to +380. We identify a cut-off point at +1 from which reviews are positive and code accordingly. An indicator variable designating whether an item or seller had received at least one feedback accounts for sellers who exclusively used the marketplace to advertise goods. All variables are set at the time of observation, and the dependent and independent variables will change over these periods.

We defined exclusion criteria and discarded drug listings with no quantity specified and a small number of outliers (e.g. 1\$ for an ounce of cannabis, 1.550\$ for 3.5 gram of cannabis). Sellers can in some markets modify a product listing. For example, a seller may use a listing to sell 0.1 gram samples of cocaine, only to later adjust the listing to 1 gram of regular cocaine. We consider these distinct products, and therefore generate unique listings based on the URL, substance, subclass, weight, and origin for every product. Thus, items which were initially advertised at an introduction price, and therefore coded as belonging to the subclass of sample and promotion offers, and later advertised regularly, or which changed quantity, are measured as distinct products. This process results in a dataset consisting of repeated measurements of reputation, escrow payment and status device rankings across individual products with fixed qualities (weight, subclass, origin). Table 7.II details the dataset before and after exclusion criteria were applied.

	Cannabis		Cocaine		Heroin	
	Empire	Silk Road 3.1	Empire	Silk Road 3.1	Empire	Silk Road 3.1
Observations	46372	9444	24567	8589	9734	3545
Listings	12320	2292	5821	1694	2039	701
Vendors	1031	250	850	277	305	102
Countries	45	24	41	25	22	12
Combinations	12712	2346	6193	1771	2227	727
Outliers	80	71	51	1	5	1
Missing quantities	892	805	308	143	132	40
<b>After exclusion</b>						
Observations	43184	6132	23295	7051	9069	2921
Vendors	1007	234	822	260	287	91
Origins	45	19	40	24	20	9

**Table 7.II** – Overview of observations before and after exclusion criteria were applied. *Observations* are the absolute number of product observations within a category. *Listings* are the number URLs referencing a listing. *Vendors* and *countries* are groups used in the analysis (random intercepts). *Combinations* adjust for the fact that a seller may change the advertised product of a listing (URL). Each is a combination of URL, subclass, weight, and origin country. *Outliers* are extreme prices that are dropped from the analysis. *Missing quantities* are products without an associated quantity.

## 7.5 Findings

We estimate a 4-level multilevel linear regression for each substance on both markets providing replication in 6 contexts (Carver, 1993). We model within-item effects of reputation, escrow, and status to control for item heterogeneity. We account for the formal institutional constraint by estimating separate models for each substance and allowing a separate intercept for each country and seller. In four models the size of the dataset is sufficient to estimate country-level quantity discounts as well. Models were estimated with restricted maximum likelihood in R using the lme4 library with tabulation and visual presentation aided by the sjPlot and ggeffects libraries (Bates, Mächler, Bolker, & Walker, 2015; Lüdtke, 2018a, 2020). Variance inflation factors and residual plots showed no indications of multicollinearity ( $VIF < 4.0$ ) or heteroskedasticity, although we note non-normal residuals, which may affect standard errors, though the extent may be mitigated by the large sample sizes.

Model estimates are shown in Table 7.III. We begin the analysis with the ran-

	Cannabis		Cocaine		Heroin	
	Empire	Silk Road 3.1	Empire	Silk Road 3.1	Empire	Silk Road 3.1
Predictors	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$	$\beta$
Intercept	2.618 *** (2.563 – 2.672)	2.516 *** (2.429 – 2.603)	4.480 *** (4.365 – 4.595)	4.332 *** (4.227 – 4.437)	4.249 *** (3.926 – 4.571)	4.214 *** (3.984 – 4.443)
log(Weight in grams)	-0.159 *** (-0.172 – -0.147)	-0.171 *** (-0.178 – -0.163)	-0.136 *** (-0.164 – -0.108)	-0.109 *** (-0.129 – -0.090)	-0.157 *** (-0.181 – -0.132)	-0.100 *** (-0.111 – -0.089)
Inactive item (Reference: Active item)	0.010 *** (0.008 – 0.013)	0.025 *** (0.017 – 0.033)	0.010 *** (0.006 – 0.015)	0.002 (-0.005 – 0.008)	0.017 *** (0.010 – 0.023)	0.009 (-0.002 – 0.019)
<i>Subclass (Reference: Regular)</i>						
Legal brand	0.421 *** (0.385 – 0.458)	0.594 *** (0.415 – 0.773)				
Outdoor	-0.385 *** (-0.411 – -0.359)	-0.369 *** (-0.433 – -0.305)				
Sample/intro/promo	-0.102 *** (-0.133 – -0.070)	-0.411 *** (-0.546 – -0.276)	-0.096 *** (-0.121 – -0.071)	-0.093 *** (-0.137 – -0.048)	-0.137 *** (-0.202 – -0.072)	-0.224 ** (-0.374 – -0.074)
Social cocaine			-0.508 *** (-0.544 – -0.473)	-0.376 *** (-0.434 – -0.317)		
Afghan heroin					-0.119 *** (-0.174 – -0.064)	-0.289 *** (-0.389 – -0.188)
Asian heroin					0.314 *** (0.239 – 0.389)	0.209 * (0.037 – 0.381)
Black Tar Heroin					-0.128 ** (-0.216 – -0.039)	-0.048 (-0.226 – 0.129)
Crack (Reference: Cocaine)			0.103 *** (0.079 – 0.127)	0.069 *** (0.039 – 0.099)		
log(Positive seller ratings)	-0.003 (-0.011 – 0.005)	0.006 (-0.008 – 0.019)	0.005 (-0.002 – 0.011)	0.011 * (0.001 – 0.021)	0.019 ** (0.006 – 0.032)	-0.005 (-0.027 – 0.018)
log(Negative seller ratings)	0.010 *** (0.008 – 0.012)	0.004 (-0.003 – 0.010)	0.008 *** (0.004 – 0.012)	-0.007 ** (-0.012 – -0.003)	-0.008 * (-0.014 – -0.001)	-0.026 *** (-0.036 – -0.017)
log(Trust level)	0.008 *** (0.004 – 0.012)		0.013 *** (0.007 – 0.019)		0.008 (-0.002 – 0.019)	
log(Level)		0.011 (-0.001 – 0.023)		-0.011 * (-0.022 – -0.000)		-0.004 (-0.023 – 0.014)
<i>Escrow (Reference: Full escrow)</i>						
Multisignature escrow	-0.003 (-0.018 – 0.012)		0.021 (-0.033 – 0.075)		0.247 * (0.056 – 0.438)	
Finalize early (100%)		-0.060 *** (-0.081 – -0.039)		-0.012 ** (-0.021 – -0.003)		-0.033 *** (-0.047 – -0.018)
Finalize early (50%)		-0.011 (-0.023 – 0.001)		-0.009 * (-0.016 – -0.001)		0.013 (-0.002 – 0.028)
<b>Random Effects</b>						
Residual Variance	0.002	0.003	0.003	0.002	0.003	0.002
Between-group variance						
Listing	0.039	0.044	0.036	0.025	0.057	0.050
Vendor	0.325	0.190	0.152	0.105	0.299	0.244
Country	0.006	0.006	0.091	0.027	0.457	0.061
Random-slope variance						
Vendor * log(Positive seller ratings)	0.010	0.004	0.004	0.002	0.007	0.005
Country * log(Weight in grams)	0.001		0.005	0.001	0.002	
Slope-intercept correlation						
Vendor	-0.854	-0.781	-0.811	-0.483	-0.775	-0.791
Country	0.493		-0.221	-0.889	-0.905	
ICC	0.988	0.980	0.984	0.987	0.996	0.991
N						
Listings	12412	2117	6069	1721	2181	711
Vendors	1007	234	822	260	287	91
Countries	45	19	40	24	20	9
Observations	43184	6132	23295	7051	9069	2921
Marginal $R^2$ / Conditional $R^2$	0.306 / 0.992	0.375 / 0.988	0.235 / 0.988	0.212 / 0.990	0.150 / 0.996	0.233 / 0.993

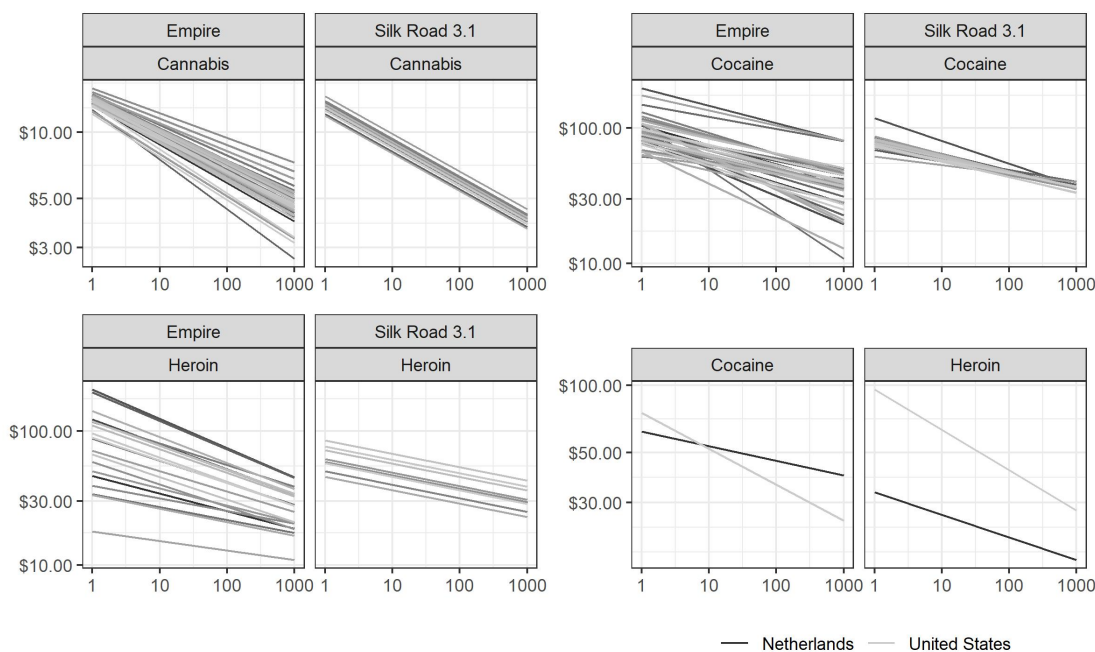
**Table 7.III** – Fixed and random effects of hierarchical linear regression models. A model is estimated for each substance and market. 95% confidence interval,  $p$ -values based on Wald-tests. The listing level is the *combination* described earlier which is a distinct URL, subclass, quantity, and origin. Note that crack cocaine is not treated as a subclass but as a binary variable. This is to allow differentiation between a cocaine sample and a crack sample. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

dom effects and quantity discount estimates showing drug pricing between countries. For the analysis of fixed effects, we emphasize back-transformed and estimated effects rather than focusing on  $p$ -values and coefficient estimates exclusively, since price-per-gram is an easily graspable and substantive quantity (Bernardi et al., 2016).

### Quantity discounts and country-level variance in drug prices

In line with the risks and prices framework, we find significant and varying quantity discounts for each substance at the population-level, with cannabis estimated at -0.159 and -0.171, cocaine at -0.136 and -0.109, and heroin at -0.157 and -0.1. As both outcome and quantity are log transformed, the coefficients for quantity discounts may be interpreted so that a 1% increase in quantity yields a reduction of 0.171% in price-per-gram of cannabis at the population-level on the Empire platform. The difference in population estimates and observed group-level slopes is reflective of their demographic composition, in which Silk Road 3.1 skews heavily European. These estimates are broadly consistent with past research on online drug markets which finds quantity discounts for cannabis of -0.17 and -0.18, and -0.10 for cocaine (Červený & van Ours, 2019; Espinosa, 2019; Moeller et al., 2020), though inconsistent with Przepiorka et al. (2017) which find a discount of -0.20 for all three substances.

All models include a country-level intercept for price-per-gram and a slope for quantity discounts (except for heroin and cannabis on Silk Road 3.1 market). Figure 7.1 (downright) shows this variation with an illustrative example of the difference between cocaine and heroin on the Empire platform for the Netherlands and the United States, which represent two distinct drug policy regimes (Levine, 2003). Despite differences, both markets show the same structural patterns: Variance at the country-level intercept for cannabis is very low, 0.006 and 0.006, larger for cocaine (0.091, 0.027), and largest for heroin (0.457, 0.061). The lower country-level variance on the Silk Road 3.1 platform, as opposed to Empire Market, is likely attributable to the demographic composition of sellers across countries. The quantity

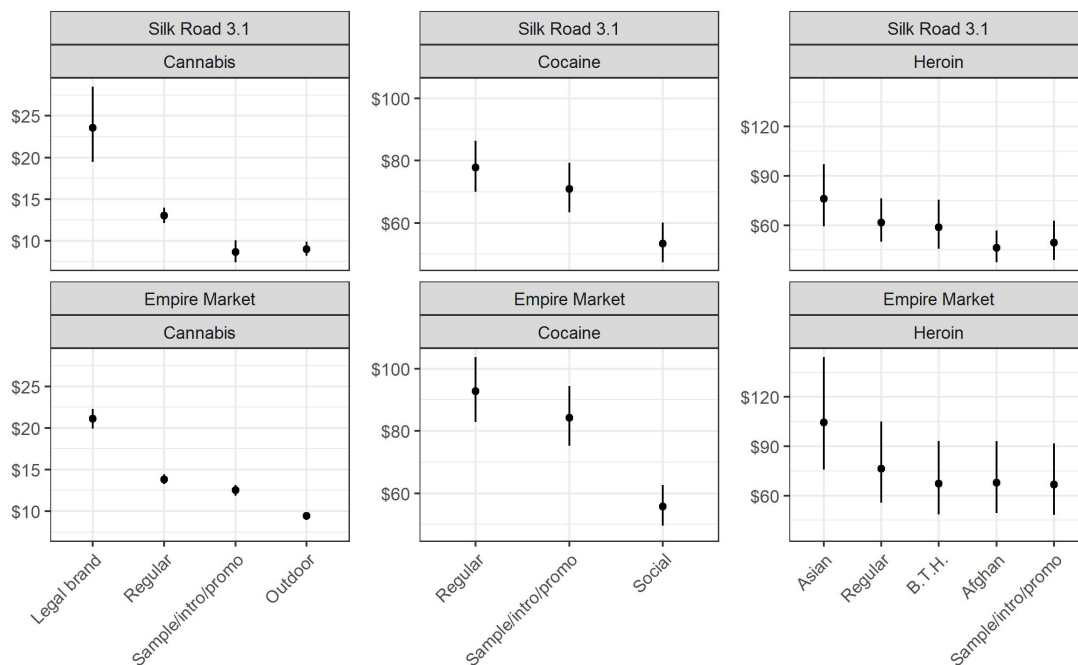


**Figure 7.1** – Estimated quantity discounts with country-level intercept and slope and an illustrative example (downright) of drug policy regime differences.

discount on Empire for cannabis shows a pattern of "fanning out" with a correlation between intercept and slope of 0.493. Conversely, for both cocaine (-0.221, -0.889) and heroin (-0.905) we observe negative correlations between intercept and slope, meaning that countries with a higher intercept have a steeper quantity discount.

### Product differentiation

For each substance we include a categorical variable to distinguish between largest and most distinct subclasses. These are within-category classes of products which may be associated with purity/quality premiums and discounts. Figure 7.2 shows the estimated price per gram of each drug-subclass combination. Products characterized as introductory, promotions, or samples, are for each drug subclass significantly ( $p < 0.01$ ) reduced in price in the range of -0.093 to -0.411. For herbal cannabis, we find significant discounts of the subclass outdoor at -0.385 and -0.369 in both markets ( $p < 0.001$ ), and large premiums of 0.421 ( $p < 0.001$ ) and 0.594

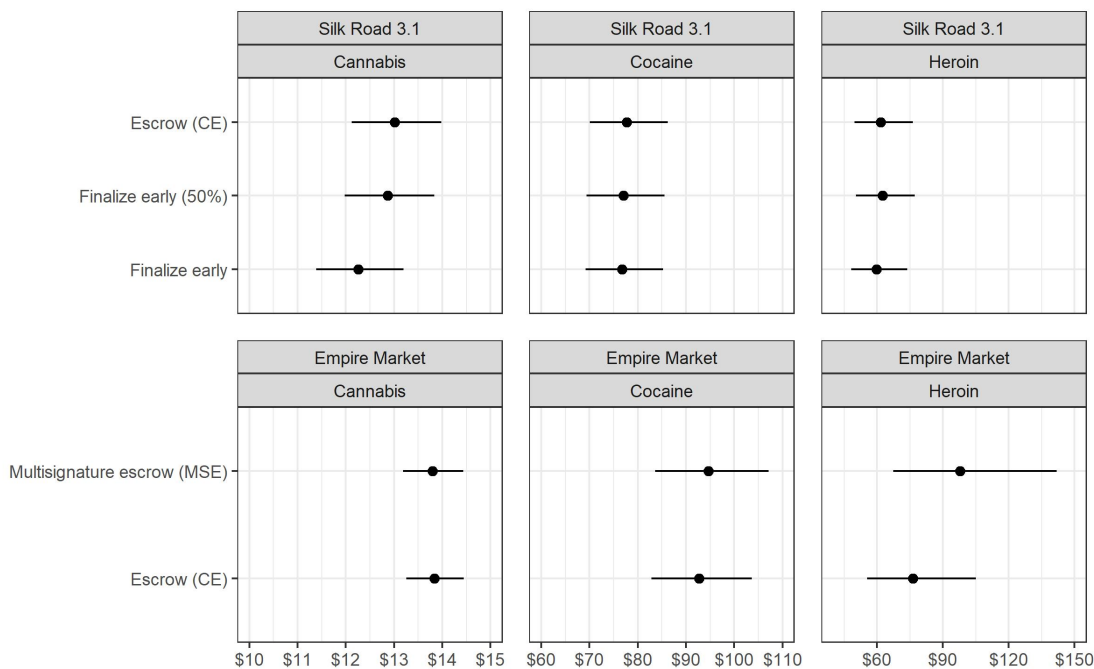


**Figure 7.2** – Estimated price of 1 gram across substances. Internal differentiation is by subclass with reference being "regular" product.

( $p < 0.001$ ) on cannabis diverted from legal sources, which are typically Californian brands. For cocaine, the social subclass is significantly discounted ( $\beta = -0.508, \beta = -0.376, p < 0.001$ ) suggesting price is adjusted by purity (Reuter & Caulkins, 2004) while, interestingly, crack adds a premium ( $\beta = 0.103, \beta = 0.069, p < 0.001$ ). For heroin, we find products advertised as Asian in origin have a significant premium on both Empire ( $p < 0.001, \beta = 0.314$ ) and Silk Road ( $p < 0.05, \beta = 0.209$ ), corresponding to its higher purity (Ciccarone, 2009). Conversely, Afghan heroin is sold at a discount ( $p < 0.001, \beta = -0.119, -0.269$ ) while Black Tar heroin is only significantly discounted on Empire ( $p < 0.05, \beta = -0.128$ ). These estimates suggest some subclasses carry a large premium while others are discounted.

## Payment methods

Figure 7.3 shows the estimated prices for one gram of each substance across payment methods. Despite the remarkable size of the Empire dataset, centralized



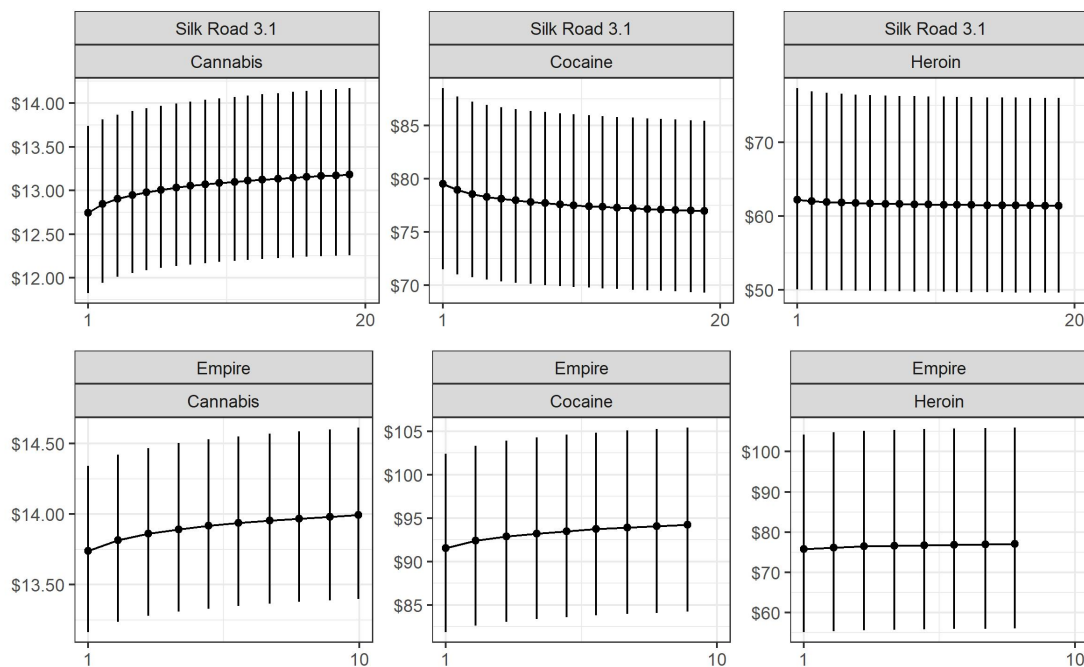
**Figure 7.3** – Estimated price of 1 gram sold using different payment modes.

escrow is predominant as opposed to Silk Road 3.1 (see Table 7.I). Coefficient estimates for multisignature are slightly higher, suggesting that vendors charge a slight premium though estimates are only significant for heroin ( $p < 0.05, \beta = 0.247$ ). On Silk Road 3.1, where advance payment (finalize early) is widely available, it is consistently associated with a significant discount reducing the price per gram ( $\beta = -0.060, -0.012 - 0.033, p < 0.01$ ). However, the 50% escrow option is only significant for cocaine ( $\beta = -0.009, p < 0.05$ ). We note, however, that effects are moderate in terms of cents and dollars. At their largest, a seller is estimated to reduce the price of a gram of cannabis from 13 to 12.2 USD.

### Status devices

Figure 7.4 shows the estimated prices for 1 gram of each substance at differing intervals of the status devices provided by the platforms, vendor level on Silk Road 3.1 (ranging from 1 to 20) and vendor trust level on Empire (ranging from 1 to



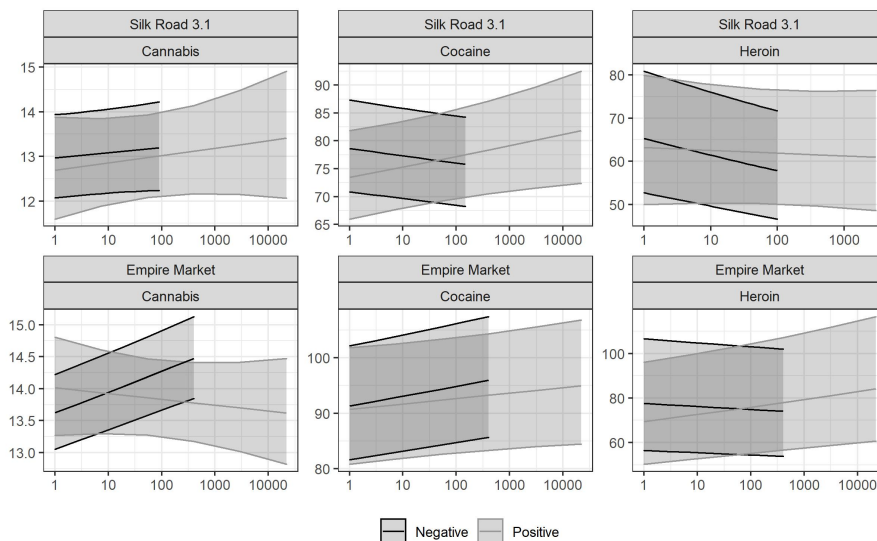


**Figure 7.4** – Estimated differences in price for 1 gram depending on status level.

10). 4/6 estimates are positive in the range of 0.08 to 0.013, though only two are significant ( $p < 0.001$ ). Again, effects are modest at best, and compounded our estimates suggests that an Empire seller would increase the price of a gram cannabis from 13.7 at the lowest level to 14 USD at the highest level and a gram of cocaine from 90.5 to 93.2 USD. These findings only provide limited

## Reputation

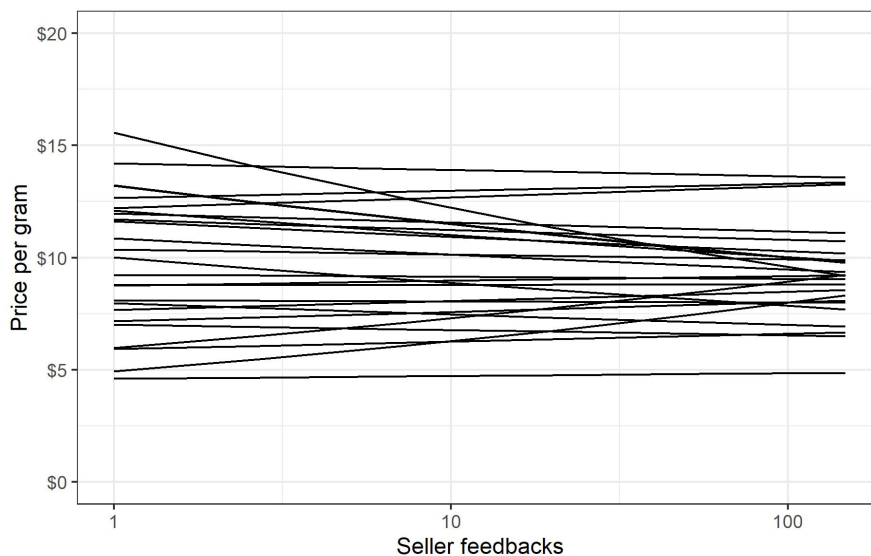
In line with the literature, we hypothesized that sellers would respond to negative and positive feedback by decreasing and increasing price. Figure 7.5 shows the estimated prices per gram for each substance at a scale of the lowest and highest number of positive and negative feedbacks observed for each combination of platform and substance. Positive feedback follows the expected direction in 4/6 cases in the range of 0.05 to -0.019 but is significant in only two cases ( $p < 0.05$ ). Negative feedback follows the expected direction in 3/6 cases, in the range of -0.07 to -0.026



**Figure 7.5** – Estimated differences in price for 1 gram across increasing negative and positive feedback. Note, that the X-axis log-scaled and allowed to reach 10.000 positive feedback.

( $p < 0.05$ ). In contrast to previous research, our results suggest that sellers neither consistently increase price on receiving positive feedback nor decrease on negative feedback. This replicates both Červený and van Ours (2019) and Espinosa (2019).

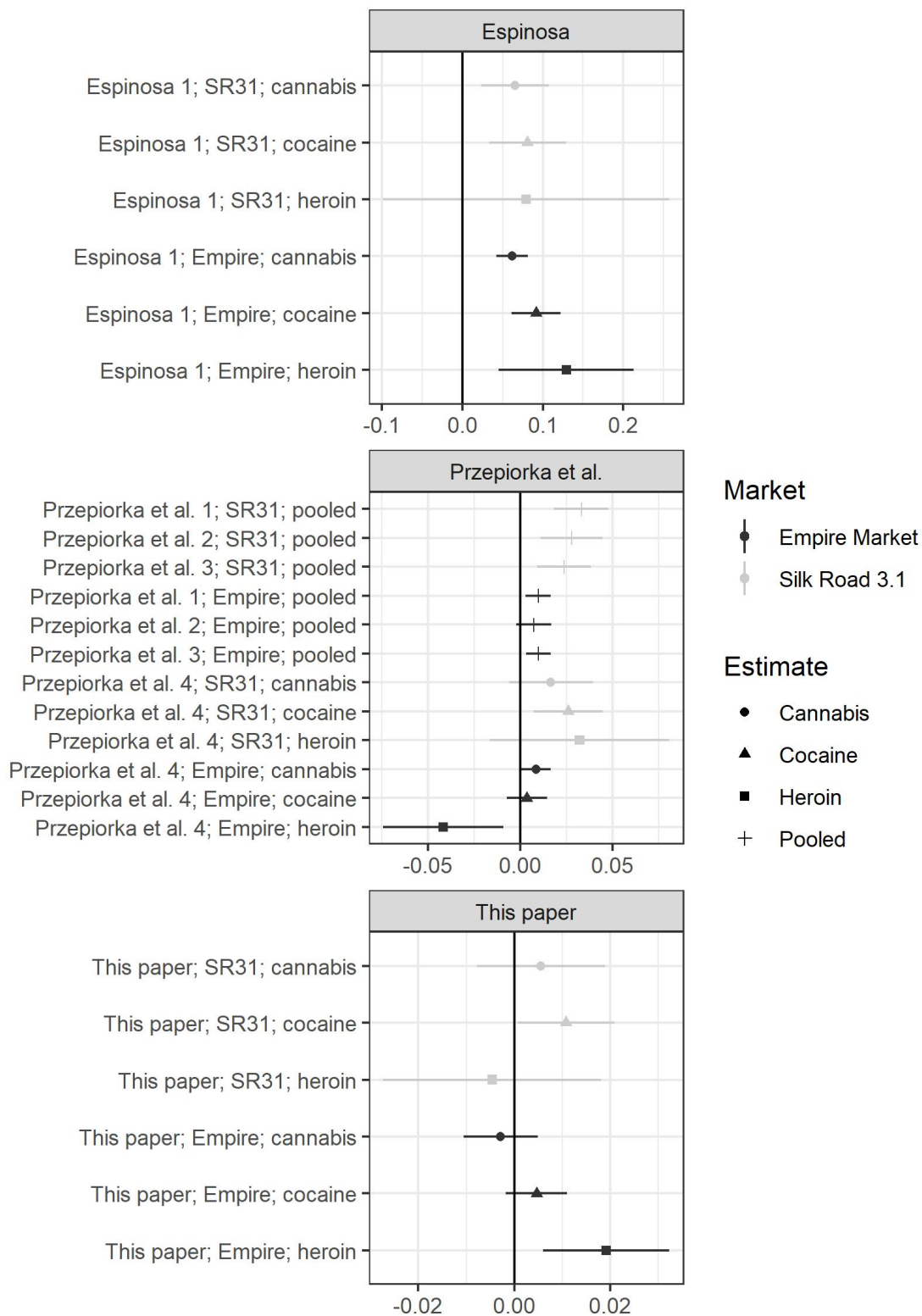
We allowed the coefficient of positive feedback to vary across vendors, allowing each to respond differently to an increase in their reputation score. Across all models, we find a negative correlation between a vendor's intercept and the coefficient for reputation ranging from -0.483 to -0.854. This suggests that those who start at a lower price respond to the accumulation of feedback by increasing their prices. Effects thus differ on population- and group-levels. This pattern is shown in Figure 7.6, which plots the group-level coefficient for positive feedback for 25 randomly sampled cannabis vendors on Empire Market. As illustrated, the coefficient varies and vendors who start at a high mean price-per-gram tend to discount product, while those who begin at low prices add a premium, as their reputation accumulates. This suggests that there is variation in how sellers respond to accumulating feedback.



**Figure 7.6** – Estimated group-level coefficient of reputation for 25 random cannabis sellers on Empire.

### Robustness assessments

Reputation premiums are the most scrutinized in the literature (Červený & van Ours, 2019; Espinosa, 2019; Hardy & Norgaard, 2016; Przepiorka et al., 2017), and argued to replicate those of licit online markets (Diekmann et al., 2014). As noted earlier, results are inconsistent across studies, and within-seller estimates may be misleading if they assume homogeneous supply. We therefore replicate past research to examine whether reputation effects are sensitive to model specifications and/or sub-setting. We replicate Espinosa (2019) using a multilevel model with seller-level random effects based on the largest crawl (Espinosa 1). We further exclude status from this model because sub-setting creates multicollinearity. We replicate Przepiorka et al. (2017) using fixed effects regression by **a**) reducing repeated measurements to their first observation, and **b**) pooling drugs in the same model using a categorical variable (Przepiorka et al. 1). We adjust the assumption of within-seller homogeneity and estimate models based on the last and a random observation (Przepiorka et al. 2, and 3). We then abandon the assumption that all drugs share a population-level quantity discount (Przepiorka et al. 4).



**Figure 7.7** – Estimates for positive reputation contrasted to alternate data- and model specifications. X-axis is the coefficient estimate for positive reputation. Note, that the X-axis varies to account for the first and second panel having larger estimates and wider confidence intervals.

Figure 7.7 shows the estimated reputation effects of all models, as well as those derived from our model. We replicate, defined as similar effects, both Espinosa (2019) and Przepiorka et al. (2017). For the cross-sectional replication of Espinosa (2019) coefficients are in the range of 0.06 and 0.13 and replicate the study. We also replicate Przepiorka et al. (2017) using the original specification reaching effects of 0.01 and 0.03 close to the 0.02 observed in the study. Choosing the last or a random observation of a product estimates are roughly same (Przepiorka et al. 2 and 3). However, the fourth specification, in which a separate model is estimated for each substance, yields coefficients in the range of -0.04 and 0.03 (Przepiorka et al. 4). Thus, on estimating a model for each substance separately, rather than one for all three drugs, there is not a consistent positive effect of reputation.

Within-item estimates suggest smaller reputation effects than both a longitudinal within-seller or cross-sectional design (see Figure 7.7). Further, we observe that pooling all drugs in one model can suggest reputation effects for all three drugs when this is not the case. We stress that designs are not immediately comparable. Within-seller models estimate how a seller will change price of e.g. 1 gram of cocaine, whereas the within-item estimate is for an individual product for sale (e.g. the listing "1 gram of social cocaine"). Conceptually, these findings may be interpreted as observing a positive association between reputation and price, but when seller- or item-level heterogeneity is taken into account, these effects are reduced in magnitude and possibly insignificant.

## 7.6 Discussion

We proposed a framework of price formation in online drug markets wherein sellers operate within an institutional context structured by risks (Moeller & Sandberg, 2019; Reuter & Kleiman, 1986) and social processes reducing uncertainty allow sellers to adjust prices (Beckert & Wehinger, 2013; Odabaş et al., 2017a). We assessed the model empirically using repeated measurements of prices in two cryptomarkets and found that prices follow a basic structure outlined in the litera-

ture on drug prices: Quantity discounts are significant and vary across substances and countries. We find that sellers relatively consistently set prices in accord with advance payment, but less consistently so for status and reputation. We begin by discussing our findings. Hereafter, we discuss theoretical approaches to the study of illicit online markets. We conclude by highlighting the utility of online data for policy and research.

A comprehensive analysis of the country-level variance in drug prices and quantity discounts we observe is beyond the scope of this paper. However, the negative correlation between intercept and quantity discount supports the argument that a higher risk is reflected in a higher price-per-gram and subsequently encourages larger discounts (Moeller & Sandberg, 2015; Smart et al., 2017). The varying intercepts for cocaine and heroin likewise conform to the significant mark-ups that follow the costs incurred by import (Boivin, 2014), which indirectly also represents the distance from the originating country. Thus, our findings provide evidence that formal institutional constraint remains central to price formation in illicit online markets (Moeller & Sandberg, 2019). This is the first component of our model, the assumption that drug prices are principally a function of institutional constraints enforced by states (Reuter & Kleiman, 1986). We also find extensive within-category variation contingent on drug subclasses. Except for crack, all suggest that price is purity-adjusted (Caulkins & Padman, 1993). For example, "social cocaine" distinguishes less pure products. The premium on crack may be caused by its disproportionate policing in line with the risks and prices framework (L. Davis, 2011).

The analysis of prices does not end with the estimation of purity-adjustments or quantity discounts. Price can elucidate social organization (Beckert, 2011), and we compliment the traditional approach to drug prices by highlighting the internal dimension of governance - the productive function of informal institutions which can stabilize markets (Beckert & Wehinger, 2013; Fligstein, 2001). We find evidence that sellers set prices in accord with escrow, reputation, and status, but these effects are not uniform across platform and substance. Contrasted to purity-

adjustments through subclasses, these should therefore be interpreted cautiously. Put bluntly, the effects of socio-technical devices are less impressive if price can be increased more easily by adding baking powder to cocaine to produce crack (Ouellet et al., 1997). The consistent estimates for samples and promotional offers, however, follows the reasoning that low-reputation sellers use promotional offers to attract customers and build trust as a competitive strategy (Ladegaard, 2018a). Finally, we stress that while reputation effects may be consistent in licit online markets, there is only limited support and inconclusive evidence from illicit ones (Červený & van Ours, 2019; Espinosa, 2019; Hardy & Norgaard, 2016; Przepiorka et al., 2017). One possible explanation may be inventory costs: Sellers with a high reputation score likely sell more products, which can motivate discounting product to minimize stock and risk (Moeller & Sandberg, 2015). It should also be noted that at the "last mile" of drug distribution (Dittus et al., 2018), there may not be much "wiggle room" in price setting among retailers (Adler, 1993).

We show that reputation effects may be replicated in our data but that this requires violating some assumptions about illicit markets. We have argued that within-item measures are preferable when modeling how sellers respond to changes in their reputation and status as they value their products because homogeneous supply cannot be assumed (e.g. Adler, 1993; Denton & O'Malley, 1999). We also caution against assuming population-level fixed effects are uniform across drugs. Our robustness assessment suggests reputation effects are more complex and vary between drugs. We therefore strongly encourage the use of multilevel modeling and the mantra to keep random effect structures maximal (Schmidt-Catran & Fairbrother, 2016). However, we note that within-item estimates found using fixed effects (not included) are almost the same as those produced by our approach. Thus, if the aim is to only examine product-level and seller-level variation, multi-level modeling may not be necessary. Yet, with access to data on drug prices even "control variables" such as product subclasses, quantity discounts, and between-country variance, can be informative for other scholars because price data on illicit substances is highly limited (Moeller et al., 2020).

There is increasing awareness of the utility and cost-effectiveness of collecting observational online data with the aim of informing policy (Enghoff & Aldridge, 2019). Moeller et al. (2020) has shown that cannabis, hash, and cocaine prices in a Swedish cryptomarket compared to social media differ not in the price of 1 gram, but slightly in quantity discounts. Similarly, Cunliffe et al. (2017) find general comparability between drug prices in Australia, online and offline. Finally, a study by Martin et al. (2018) found that online markets responded swiftly to the rescheduling of opioids as supply and sales quickly increased. These similarities attest to the embeddedness of illicit online markets in formal institutional constraints which vary with legislation. This is because sellers likely source drugs offline, and thus operate only along the "last mile" of drug distribution (Dittus et al., 2018). As such, online drug markets constitute not only a novel data source for the study of drug markets, but also one that may compliment law enforcement estimates (Caulkins & Padman, 1993). Other research agendas, such as the study of deterrence and prices (Bushway & Reuter, 2008), or supply chain enforcement and regulation may also be pursued (Cunningham & Finlay, 2016).

The approach to price formation we have suggested, as externally constrained and supported by internal social processes, constitutes a theoretical departure from the dominant approach to prices in online drug markets in two ways. First, the productive function of the state is recognized. Second, we draw on criminological works on illicit online markets which have highlighted the exercise of informal social control, and unequal power relations, as conducive to market order (Dupont et al., 2016; Odabaş et al., 2017a; Wehinger, 2011). Our findings provide support for the argument that these are as relevant as reputation for price setting. In making this argument, we have suggested that the distribution of social power in illicit online markets strain the comparison to the law merchant (Milgrom et al., 1990). Although we do not find unanimous evidence that drug prices are set in complete accord with institutional sources of trust, there is ample evidence of these mechanisms supporting other aspects of exchange. Duxbury and Haynie (2018a) and Norbutas et al. (2020a) provide evidence that reputation influences buyers' choice



of seller, and Odabaş et al. (2017b) find that authentication influences network positions. However, these research agendas can gain by adopting a more holistic approach to the institutional sources of trust available to buyers, rather than focusing exclusively on individual sources.

## 7.7 Conclusion

Within this paper we have argued that the formation of drug prices in illicit online markets may be conceived of as produced by two structures; a formal institutional constraint, law, regulation, and enforcement, and internally by socio-technical devices, escrow, status, and reputation, which support price formation. We applied multilevel hierarchical regression to estimate price-per-gram for three drug types in two online drug markets. We find extensive variation in drug prices and quantity discounts across countries, as well as evidence of purity-adjusted prices. These findings are in accord with the first component of our model, and research on drug prices (Boivin, 2014; Caulkins & Padman, 1993; Reuter & Kleiman, 1986). We further observe that sellers respond to rankings, ratings, and payment modes by adjusting prices relatively consistently. Generally, advance payment is associated with discounts, whereas results are less conclusive for reputation and status. The synthesis we have proposed can integrate results from diverging theoretical viewpoints by recognizing both the constraints of formal regulation on illicit markets and their social organization while also producing policy relevant results.

## 7.8 Appendix

### 7.8.1 Substance categories and subclasses

Przepiorka et al. (2017) use a dataset collected by Christin (2013) and pool substance categories into low- (herbal cannabis and hash), medium- (ketamine, MDMA and cocaine), and high-price substances (heroin, meth), adding a dummy variable for low-quality cannabis. Conversely, Hardy and Norgaard (2016) collects only data within the category cannabis and distinguish between high- and regular quality based on vendor's self-described quality. Moreover, Červený and van Ours (2019) study cannabis prices and distinguish between Cannabis Cup strains. In the corresponding sections of these papers, neither manual coding nor validation of the dataset or subsets is not discussed with regards to substance categories, though Przepiorka et al. (2017) describes manually adding 211 items in general categories that were manually identified. In our study, the issue of classification was pressing as vendors would frequently list products in categories of their own choosing (Demant, Munksgaard, Décary-Hétu, & Aldridge, 2018).

For heroin, we discarded any advertisement that described product as "synthetic" or containing fentanyl or an analogue thereof. In addition, listings that specified product as Middle Eastern, Asian in origin or as Black Tar were classified as Afghan, Asian and Black Tar Heroin. This coding scheme separates products by geographical origin according to the three main sources of heroin, South America, Afghanistan and Asia (United Nations Office on Drugs and Crime, 2019), which in turn also reflect the differentiation in risk that follows from supply routes and the purity of the consumed product (Ciccarone, 2009). For cocaine, we separated the freebase form, crack, from cocaine powder and discarded any advertisement of "synthetic" cocaine. We further assigned product labeled as social (an indicator of diluted product) a subclass. These separations distinguish three classes of cocaine (Ouellet et al., 1997) that differ not only with regards to appearance, purity and composition, but also risk-wise through the disproportionate policing of crack relative to cocaine (L. Davis, 2011). We utilize crack as a binary variable, so that

products can both be crack and sample listings. Finally, herbal cannabis presented a unique challenge as the product can exist on a continuum from the low-grade by-products of cultivation, production and distribution, known as shake, restweed, dust or trim, likely used for production of processed cannabis forms (e.g. oils, edibles, ElSohly et al. (2016)), to the highly potent moon rocks, cannabis flower dipped in extract and rolled in trichomes. We restrict the category to products found between these two points, because the former is not intended for smoking, and the latter is a separate product class and typically not smoked. In addition, listings were assigned subclasses of legal brand if they were diverted from legal production and sold including packaging or outdoor if advertised as grown outdoors. For all three drug types, advertisements labeled as introductory offers were assigned to the subclass sample/promo. Across all categories, we did not code so-called custom or stealth listings, which were intended for one buyer. This is also done by Przepiorka et al. (2017).

### 7.8.2 Quantity and price

Przepiorka et al. (2017) describes manual coding, while Červený and van Ours (2019) do not specify how weight was coded, and Hardy and Norgaard (2016) note that automated coding was incapable of capturing all variations in specified quantity leaving an amount of un-coded data. We coded the advertised weight of products but observed that when gram and imperial units were advertised together, these would rarely be technically correct as we observed ounces in the range of 26 to 30 grams, for example. This pattern replicates the established observation that a drug unit may vary in quantity (Dwyer & Moore, 2010b; Jacques & Wright, 2015). If available, we coded the advertised amount in grams. If not, we converted from imperial units to the metric system using the most common conversion in the dataset in which 1 ounce corresponds to 28 grams. At the listing level, however, we observed that many vendors used the listing system in unintended ways. On Empire, for example, vendors are supposed to list products individually in single quantities (e.g. one gram of cocaine, an ounce of cannabis). However, some vendors

would make one advertisement allowing the buyer to choose quantity under "shipping options". In other cases, vendors would switch the product from, for example, a small sample listing into a larger quantity thus re-using the advertisement, most likely in order to transfer reviews from the old listing to the new (e.g. by turning a 0.2 gram sample listing of cocaine into a listing for 3.5 gram). Some listings on Empire had a bulk discount field available, but the non-transparent combination rendered coding infeasible. To correctly price listings, any advertisement that did not specify a single quantity was coded as the minimally offered quantity. In all cases, shipping costs were included in price to account for vendors using shipping costs to add a premium to prices, a pattern we suggest is reflective of desire among vendors to avoid price competition by making direct comparison more difficult (Beckert & Wehinger, 2013; Fligstein, 2001).

## CHAPTER 8

### BUILDING A CASE FOR TRUST: EXCHANGE RELATIONS AND RISK-TAKING IN ILLICIT ONLINE MARKETS

*This paper is solo-authored and presently pending submission. An earlier version received valuable feedback during peer-review at the American Sociological Review.*

#### **Abstract**

The emergence of illicit online drug markets has the potential to radically transform drug economies, but the existence, usage, and social implications of them hinge on the establishment of trust. Absent the social embeddedness that traditionally supports trust in illicit markets, scholars have found reputation systems and informal social control exercised by administrators as conducive to trust. Recent evidence suggests that exchange in these markets is also embedded in social relations.

In this paper, I examine the association between institutional mediation and authentication, reputation, exchange history, and the propensity to engage in more risky transactions in the online drug markets Silk Road 3.1 ( $n = 99.9635$ ) and Abraxas ( $n = 9.108$ ). I find that exchange history is predictive of transaction size, conflicting evidence for the effects of status and reputation, and the absence of institutional control to be associated with larger transactions. These findings suggest that trust in illicit online markets is not only a function of feedback systems and administrative control, but produced through ongoing exchange.

## 8.1 Introduction

The recent decade has seen the emergence of illicit online drug markets in a variety of forms across the globe. Despite their different manifestations, covertly using social media (Demant & Bakken, 2019), single-actor web shops (Kruithof et al., 2016), and large-scale platforms (Martin, 2014a), these have distinct qualities in common: Buyers and sellers establish contact under conditions of anonymity and pseudonymity, and the trade is disembedded from the local and social contexts in which it traditionally flourishes. The most prevalent mode of distribution, known as darknet markets or cryptomarkets, has grown continuously since 2011 and is no longer negligible from a law enforcement or drug policy perspective (Aldridge et al., 2018b; Europol/EC3, 2019). These markets provide a high degree of security to users through a combination of anonymization and encryption technologies, and they function in a similar manner as licit platform economies: Sellers sign up in exchange for a bond and may sell products in exchange for cryptocurrencies, typically bitcoin, under certain rules (e.g., no weapons of mass destruction) with a commission on every transaction (Christin, 2013).

Though difficult to estimate, research and seizures suggests a rapidly growing economy. Soska and Christin (2015) found seven marketplaces generated sales above 500.000 USD daily in 2014, Tzanetakis (2018a) observed one, AlphaBay, generated 94 million USD in sales between September 2015 and August 2016. This figure was later adjusted after its seizure to 1 billion during its lifespan (Europol, 2017). Sellers and buyers are concentrated within Europe, North America, and Oceania, and primarily trade within domestic and regional contexts (Demant, Munksgaard, Décary-Hétu, & Aldridge, 2018; Dittus et al., 2018; Martin, 2014a). These markets facilitate access to a global market in illicit substances, for which both price and purity may be superior (Barratt, Lenton, et al., 2016; Van Hout & Bingham, 2013). With regards to health and harm reduction, scholars have highlighted the potential of increased consumption of illicit substances, but also the near absence of physical violence (Barratt, Ferris, & Winstock, 2016; Barratt,

Lenton, et al., 2016; P. Griffiths & Mounteney, 2017). For sellers, platforms are attractive venues wherein profits may be higher while risks from law enforcement and competitors are lower (Martin et al., 2019).

The disruptive potential of these economies, and their economic and social costs for society at large, hinge on some form of stability emerging so that actors can compete and cooperate, and markets can continue to flourish (Beckert & Wehinger, 2013). This fact has not eluded law enforcement, whose interventions have aimed explicitly to dismantle and undermine trust in market institutions and sellers (e.g. Europol/EC3, 2019; New Zealand Police, 2016; RCMP, 2016). The scholarship on illicit online markets has historically emphasized the capacity of administrators to institute and maintain trust through order (Lusthaus, 2012; Odabaş et al., 2017a), or the ability of users to exercise decentralized social control through reputation systems (Hardy & Norgaard, 2016; Przepiorka et al., 2017). Recent scholarship, however, suggests that buyers engage in repeat exchanges and build up trusting relationships to sellers (Duxbury & Haynie, 2018a, 2018b; Norbutas et al., 2020a). In this paper, I further develop the notion of exchange relations as conducive to trust in illicit online markets. I suggest these are complimentary pieces of evidence that support trust. I examine this proposition by estimating the association between different sources and actors' propensity to undertake larger financial risks in two online drug markets.

## **8.2 The problem of trust in illicit markets**

Trust may be approached as both a belief, rooted in a combination of emotionality and calculative rationality, and a process oriented towards an outcome (Lewis & Weigert, 1985; Rousseau et al., 1998). This outcome implies some form of potential harm, and the "bet of trust" is based on a cognitive process in which a subjective estimate of the desired outcome is produced (Sztompka, 1999). Illicit markets exist in an oppositional relation to the state, and institutions such as courts, contracts, and regulation are absent (Beckert & Dewey, 2017b). This leaves

actors at risk of opportunism, fraud, and predation (Naylor, 2003). Market participants therefore rely on "pre-modern trust devices" (Beckert & Wehinger, 2013, p. 17), such as social networks, informal social control, or signals of trust (Gambetta, 1988b; Moeller, 2018a; von Lampe & Johansen, 2004). In practical terms, buyers in such markets are faced with intersecting uncertainties concerning the *seller* and the *product* (Dimoka et al., 2012).

The absence of state-backed regulation and product standardization give rise to extensive product uncertainty, because qualities like purity and quantity cannot readily be ascertained (Ben Lakhdar et al., 2013; Reuter & Caulkins, 2004). Similarly, opportunism is unrestrained by formal regulation which produces seller uncertainty (Jacques et al., 2014). Buyers, or trustors, therefore find themselves trading with partners with more information about their performance and product (Akerlof, 1970; Herley & Florêncio, 2010). These information asymmetries impede both cooperation and competition, lead to market inefficiencies, and are considered one of the reasons why illicit markets are highly networked (Bichler et al., 2017; Moeller, 2018a). However, these qualities are neither inherent to illegality nor drugs as products. Illicit markets are heterogeneous and vary in levels violence, market-like characteristics, and trust (see for example Adler, 1993; Hirata & Grillo, 2019; Reuter, 1984; Scott et al., 2017).

As illicit markets move online, however, the traditional bases of trust erode. Actors no longer inhabit shared worlds defined by kinship or culture (Schoenmakers et al., 2013) or exchange with known peers (Jacques & Wright, 2015; Scott et al., 2017). And under conditions of anonymity, informal social control, threats, coercion, ostracization, and reputation become either infeasible or weaken (Morselli et al., 2017). Meanwhile, predation, fraud, and opportunism persist (Moeller et al., 2017).

### 8.2.1 Sources of trust in illicit online markets

The literature on trust in illicit online markets is interdisciplinary and includes contributions from economists, sociologists, and criminologists, which all have dis-



tinct concepts and foci. Broadly, however, scholars argue that the premodern trust devices of traditional illicit markets are functionally replaced: Informal social control is exercised by administrators, and reputation is institutionalized in reputation systems. Increasing evidence suggests a third complimentary source of trust; ongoing exchange relations. A recurrent problem in research, however, is that these sources of trust are typically studied in isolation. For example, studies of reputation do not include the capacity of administrators (Hardy & Norgaard, 2016; Przepiorka et al., 2017), and neither do studies of exchange relations (Duxbury & Haynie, 2018a, 2018b; Norbutas et al., 2020a).

### **Informal social control**

Historically, earlier writings on illicit online markets by criminologists have stressed administration and governance as conducive to trust in illicit online markets. This extends a general occupation with informal social control as a means to establishing stability in illicit markets (Bouchard et al., 2020; Jacques & Wright, 2011), and a historic occupation organized groups and hierarchies operating in illicit markets (Lusthaus, 2013; Reuter, 1984). Lusthaus (2012), for example, argues that administrators "[insert] a degree of trust into a world where such trust is largely lacking" (p. 54). Administrators can do so because they remain in full control of the platform, able to ban, recommend, approve, and regulate behavior to an unprecedented degree (Moeller et al., 2017). As such, they wield a powerful repertoire of means of social control (Black, 1983). Odabaş et al. (2017b) propose that two mechanisms build trust, "second-party controls" through social relations, reputation and norms, complimented by "third-party controls", administrators who act as "guardians of trust" (p. 1271). This strain of the literature thus emphasizes power and its capacity to regulate and control as conducive to trust (see also Odabaş et al., 2017a). These can be approached as institutional sources of trust (Zucker, 1986), or as more formalized types of social control (Bakken et al., 2018; Moeller et al., 2017).

The function of administrators may be separated into authentication and me-

diation (Odabaş et al., 2017b). The former consists of, for example, entry requirements, such as bonds that must be paid in order to sell, or vetting (Dupont et al., 2017). Administrators also assign status, ranking sellers as more or less trustworthy or well-performing (e.g. "trust level 10"). Mediation consists of dispute resolution, typically in combination with escrow services. Odabaş et al. (2017b) observe that sellers verified by administrators receive more positive reviews, and Holt et al. (2013) and Holt, Smirnova, and Hutchings (2016) observe inconsistent effects of escrow on price. However, both status and escrow are generally under-scrutinized in quantitative research of online drug markets (an exception is Décary-Hétu & Quessy-Doré, 2017).

### **Reputation systems**

Illicit online markets frequently provide reputation systems wherein buyers submit feedback for their purchases (Martin, 2014b; Wehinger, 2011). Reputation systems may be conceived of as functional replacements to the informal social control that regulates behavior in traditional illicit markets (Black, 1983; Jacques & Wright, 2011). However, a distinction should be made between *reputation* in a traditional sociological sense and *reputation systems*. The latter is based on anonymous sources which differentiates it from reputation transmitted through social networks (Glückler & Armbrüster, 2003). Reputation systems have been argued to create "spontaneous order" and "order without law" by promoting cooperation (Hardy & Norgaard, 2016; Przepiorka et al., 2017).

Scholars have documented reputation premiums on products (Hardy & Norgaard, 2016; Przepiorka et al., 2017), increased cooperation (Norgard et al., 2018; Nurmi et al., 2017), and shown that new buyers tend to trade with sellers that have an established reputation (Duxbury & Haynie, 2018a, 2018b; Norbutas, 2018; Norbutas et al., 2020a). Some studies, however, have found inconsistent or non-existent reputation effects for price (Červený & van Ours, 2019; Espinosa, 2019). Thus, there is relatively consistent evidence that reputation constitutes a "capital asset" in illicit online markets (Dasgupta, 1988).

## Social ties

While social relations are crucial to the organization of traditional illicit markets (Bichler et al., 2017; Moeller, 2018a), they have proven themselves difficult to study in online settings. Most buyers do not have associated usernames, and thus it cannot be deduced who purchased from whom (see Décary-Hétu & Quessy-Doré, 2017, for a discussion). In rare cases these are available, and recent studies of cryptomarkets have observed that while buyers may initially choose sellers based on their reputation, they tend to return to the same seller for future exchanges. This has been observed using both social network analysis (Duxbury & Haynie, 2018a, 2018b; Norbutas, 2018) and discrete choice models (Norbutas et al., 2020a). Similarly, Odabaş et al. (2017b) and Décary-Hétu and Dupont (2013) observe that more successful sellers in stolen data markets are better connected.

These patterns have been argued to conform to notions of "learning effects" (Norbutas et al., 2020a), in which past information about honesty accumulates (Buskens & Raub, 2002). Within the literature on illicit markets, the tendency to exchange with known partners is well-established and frequently observed (Moeller, 2018a). The suggested process, however, is simple: Exchange is conducive to trust through first-hand evidence of the other's trustworthiness (Granovetter, 1985, p. 490).

### 8.3 A burden of evidence: Trust as a cognitive process

Trust is not a disposition, but an estimate of the other's trustworthiness based on a Bayesian cognitive process (Hardin, 1993). Reputation systems, informal social control, and social ties, therefore constitute an informational base which a buyer can draw upon (Granovetter, 2017, chapter 3); a socially embedded cognitive process (Möllering, 2005b). Reasoning in extension of laboratory studies of trust games (Glaeser et al., 2000), the transaction value itself can be considered as an expression of trust, the value of Sztompka's (1999) "bet of trust". There is always a risk that a trustee other may turn out to be an opportunist. Following the idea

of trust as building a case; as evidence of trustworthiness accumulates, buyers are therefore more likely to take larger financial risks because the ratio of potential gain to loss shifts (Coleman, 1994, p. 99). Thus, it is hypothesized that:

1. *The value, or size, of a transaction will increase with the availability of evidence of trustworthiness.*

Concrete evidence and individual experience is generally assumed to provide the best evidence of trustworthiness (Buskens & Raub, 2002; Glückler & Armbrüster, 2003; Granovetter, 1985). This is supported in recent research, which suggests that repeat buyers rely on past exchanges above reputation (Duxbury & Haynie, 2018a, 2018b; Norbutas, 2018; Norbutas et al., 2020a). Consequently, it is hypothesized that:

2. *Exchange history with a seller moderates the association between transaction value and other evidence of trustworthiness*

### **8.3.1 Research design**

The two hypotheses are tested in the context of two cryptomarkets, Abraxas and Silk Road 3.1. Abraxas is part of a larger archive curated by Branwen et al. (2015), whereas Silk Road 3.1 was collected as part of the DATACRYPTO project (Décary-Hétu & Aldridge, 2015). Both were collected using webcrawling and -scraping (see Munksgaard et al., 2016, for an introduction in the context). Abraxas and Silk Road 3.1 correspond to ideal typical cryptomarkets (Martin, 2014b), sharing some commonalities with other illicit online markets for hacking services and stolen data (Odabaş et al., 2017a). However, they are unique as they include an identifier for every buyer, a rarity in such markets (Décary-Hétu & Quessy-Doré, 2017). Both markets have similar reputation systems; allow sellers and buyers to transact outside escrow; and rank sellers according to their performance. This allows the inclusion all three sources of trust in analysis. Notably, the datasets are of different sizes and collected over different time spans. Both were relatively small markets,

and the Abraxas dataset covers 172 days (January 1st to July 6th 2015), whereas the Silk Road 3.1 dataset spans 624 days (January 16th 2018 to October 2nd 2019).

Drug transactions in this dataset may be conceived of as nested in levels within which errors will correlate. Drug prices vary across locales and substance, vendors will have different sources, be situated in different locales, and can set prices themselves, and buyers can be expected to have different purchase strategies, origin countries and funds available (Cunliffe et al., 2017; Moeller et al., 2020; Paquet-Clouston et al., 2018). Using OLS regression would therefore violate the assumption of uncorrelated error terms. Multilevel linear regression, also known as random- or mixed effects regression, relaxes the assumption of uncorrelated error terms by estimating constants and coefficients on a group and population level (Gelman, 2006). The former are the random effects and the latter the fixed effects. A four-level crossed design is utilized in which the *transaction* by a *buyer* is nested in a *vendor*, *category*, and *origin*. This is a four-level crossed design. While the model is complex, it is generally advised to always fit the maximally justified random effect structure when possible (Schmidt-Catran & Fairbrother, 2016).

## Variables

The dependent variable is the value of a transaction, which is measured using product reviews (i.e. feedback) as a proxy. This is standard in the literature (e.g. Décarry-Hétu & Quessy-Doré, 2017; Przepiorka et al., 2017). Variables are set for every transaction dynamically. This means that values (e.g. reputation) will vary depending on when a transaction took place. On Abraxas, feedback that was unique in terms of text, rating, product, and username across all crawls was kept. For each vendor on Silk Road 3.1, a complete record of all feedback in the crawl where they had the most feedback was used. On Silk Road 3.1, the price paid was available for every feedback, while the Abraxas dataset necessitated joining the product price. Product prices from Abraxas were exchanged from bitcoin to USD using the daily weighted price from the bitcoin exchange BitStamp when prices in USD were unavailable. Information about sellers or products (e.g. price) was

joined with feedback based on the smallest time difference as recommended by Stinenbosch (2019). In cases where these could not be determined, observations were marked as such (e.g., "Unknown escrow status"). Descriptive statistics are shown in Table 8.I.

Buyers may purchase multiple products from the same vendor at one time and leave multiple reviews the same day. These were therefore combined to represent one transaction. Items were qualitatively coded into categories and products belonging to more than one were labeled as "mixed drugs". If products were sold within different escrow categories, they were labeled as such. In case the buyer purchased a nondrug item (e.g., a bong) along with a drug, the transaction is merged but categorized as "drugs and nondrugs". The origin country of a product was set as the most frequently stated origin of the vendor selling the product. If no country could be set, transactions were labeled as coming from an unknown country which is a category at the random level. 774 transactions fell into this category on Abraxas versus 11.184 on Silk Road 3.1.

Each market presented ratings differently, a scale of 1-5 stars on Abraxas, and a numerical score on Silk Road 3.1. On Silk Road 3.1, a cut-off point at 1 was identified, below which feedback was considered negative (these were also marked in green, as opposed to red on the website). Any feedback below 5 stars was considered negative on Abraxas. This strict distinction between positive and negative feedback is discussed by Przepiorka et al. (2017), who note that non-five-star ratings are "extraordinary" (p. 756), a finding consistent with studies of licit markets (e.g. Resnick & Zeckhauser, 2002). After recoding 98% and 95% of feedback were positive. This propensity for only a fraction of feedback to be negative is frequently observed in reputation systems (Filippas, Horton, & Golden, 2018). In line with the literature, a measure of a seller's negative and positive reputation over their lifetime is used (Przepiorka et al., 2017).

The authenticating function of the marketplace administration is available as status designations in both markets. On Abraxas, a badge designating a seller as gold-, silver- or bronze vendor is used. On Silk Road 3.1, the designation Silk

	Abraxas	Silk Road 3.1
N	9108	99635
log(Transaction value)	4.06 (1.13) (0.20 – 7.78)	4.30 (1.05) (0.00 – 9.27)
Sample product (%)	462 (5.1)	2582 (2.6)
Similar active products	3.10 (1.38) (0.00 – 5.41)	4.04 (1.37) (0.00 – 8.20)
log(Positive ratings, lifetime)	3.51 (1.57) (0.00 – 6.64)	5.45 (1.56) (0.00 – 8.20)
log(Negative ratings, lifetime)	0.81 (0.92) (0.00 – 4.33)	1.39 (1.18) (0.00 – 4.64)
Escrow (%)		
50% Escrow		8091 (8.1)
Escrow	4298 (47.2)	65171 (65.4)
Finalize Early	3427 (37.6)	14662 (14.7)
Guest user		7054 (7.1)
Mixed Escrow	87 (1.0)	740 (0.7)
Unknown Escrow Status	1296 (14.2)	3917 (3.9)
log(Level)		2.08 (0.66) (0 – 3.00)
Silk Road League (%)		74154 (74.4)
Vendor badge (%)		
No badge	1303 (14.3)	
Bronze vendor	2161 (23.7)	
Silver vendor	1753 (19.2)	
Gold vendor	3891 (42.7)	
log(Sum of past exchanges w/ vendor)	1.69 (2.41) (0.00 – 9.14)	1.85 (2.67) (0.00 – 11.13)
log(Sum of past exchanges w/ other vendors)	2.40 (2.66) (0.00 – 9.25)	3.79 (3.01) (0.00 – 11.41)

**Table 8.I** – Descriptive statistics. For continuous predictors mean, SD, and range are shown. Log-transformed variables incremented by one if containing zero. For categorical predictors,  $n$  and percentage is shown.

Road League and a ranked vendor level between 1 and 20<sup>1</sup> are used. Alternative badges commending an activity (e.g. "Stimulants Master", "Escrow God") were also available on Silk Road 3.1, but the two are chosen as they rank a general performance. The designation Silk Road League is given to a vendor maintaining an average rating of 99% upon reaching a feedback score of 600 points. A thorough search of the archives and inspection of pages did not reveal information about how the ranking on Abraxas came to be. In both markets, there is no indication of multicollinearity when including both status and reputation in models.

The mediating function of the administration as a source of trust is measured using a categorical variable representing whether the transaction necessitated escrow, early finalization, or a variety thereof. If a buyer purchased multiple products from a seller both in and outside escrow on the same day, these are coded as "mixed escrow". For Silk Road 3.1, it is further specified if the buyer is a "guest user", a purchase mode which allows a buyer to transact without using a profile but which necessitates early finalization. Silk Road 3.1 also offered a 50% escrow option which is included.

Exchange relations are rendered operational by using the sum of past exchanges with a vendor, rather than the existence of a tie (Décary-Hétu & Quessy-Doré, 2017), to more accurately reflect the burden of evidence provided by taking large and small risks. In addition to the grouping structure two control variables are included: Products listed as samples, and a simple measure of the supply-side context of the transaction, the number of active products within the same category shipping from the same origin in the last 30 days (Paquet-Clouston et al., 2018). To account for skewness and aid interpretability all continuous variables were log-transformed (Gelman & Hill, 2007, p. 59).

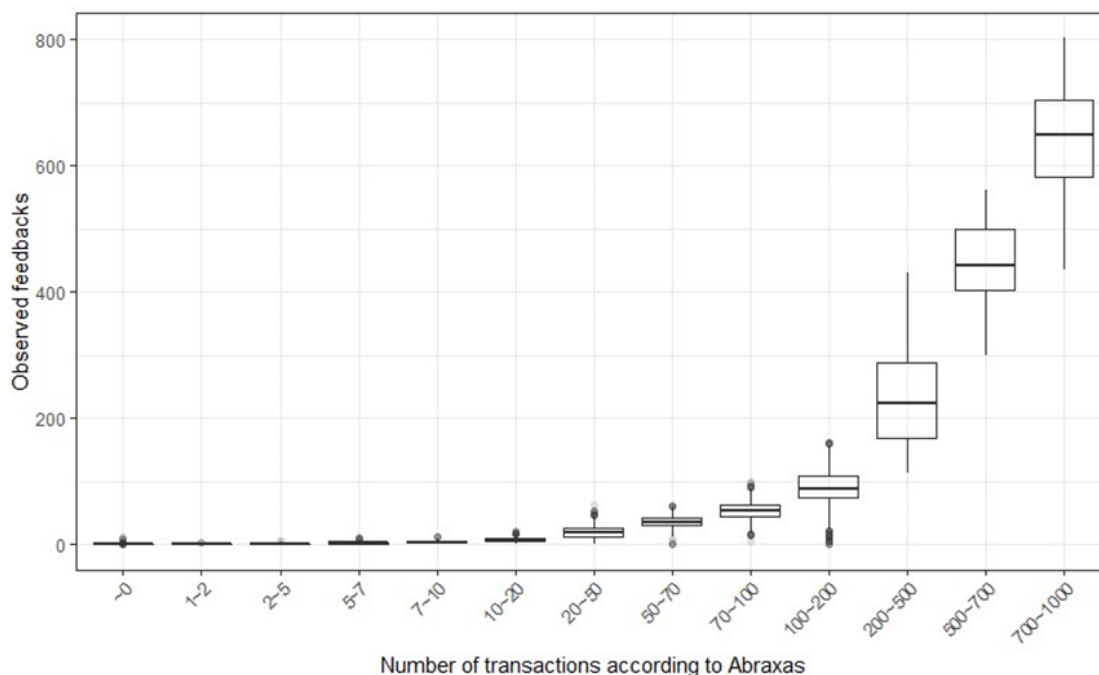
## Limitations

Scholars have argued that the extent and quality of data provided by cryptomarkets is "unprecedented" (Barratt & Aldridge, 2016). Nevertheless, data from

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<sup>1</sup>Original scale of 0 to 19 incremented by 1 for log-transformation.





**Figure 8.1** – Boxplot showing observed number of feedbacks versus the number of transactions by the vendor as presented on-site for all unaggregated transactions.

illicit online markets is associated with some uncertainty (Kruithof et al., 2016; Munksgaard et al., 2016; Stinenbosch, 2019), especially feedback when used as a proxy for transactions. Kruithof et al. (2016) suggest that 71%-81% of cryptomarket transactions result in feedback, which is corroborated by Stinenbosch (2019) using data from a seized market.

Abraxas indicated the range of a seller’s actual completed transactions and Figure 8.1 shows a boxplot of the number of observed feedbacks versus the number of sales the vendor has conducted according to Abraxas. As can be seen, there is a tendency towards underestimation when using feedback as a proxy for sales. Similarly, Silk Road 3.1 showed the number of transactions in each buyer profile, for which there is a corresponding number of feedbacks in 65% of cases, with 83% of the sales listed in profiles being recorded as feedback at the aggregate level. Thus, not all on-platform economic exchange is measured, which has implications for measures of past exchanges. The statistical approach, multilevel regression,

seeks to mitigate this problem of unobserved exchanges by allowing each buyer to have a separate intercept. However, exchange history should still be interpreted as observed, rather than exact, exchanges.

## 8.4 Findings

Each market was analyzed separately estimating a full model and a model including interactions between the sum of past exchanges, status, and reputation. Models were fitted using REML estimation in R using the lme4 library, with visualization, tabulation and analysis assisted by sjstats and sjPlot (Bates et al., 2015; Lüdtke, 2018b, 2020). Model diagnostics were reviewed finding no issues in terms of heteroskedasticity, but both models bordered on violating the assumption of normally distributed residuals. This poses a problem in terms of prediction, though coefficients are still expected to be correct (Gelman & Hill, 2007, p. 46). Models without interaction terms showed no indications of multicollinearity ( $VIF < 4.0$ ).  $p$ -values were computed using Wald Z-test. 95% confidence intervals were computed based on standard errors and were verified using parametric bootstrap finding confidence intervals within the same range. Table 8.II presents the results from the multilevel models with and without interactions. The conditional and marginal  $R^2$  scores are estimated as suggested by Nakagawa, Johnson, and Schielzeth (2017), designating the variance explained by the random and fixed effects (conditional), and the fixed effects alone (marginal).

### Random effects

Intra-class correlation, ICC, the proportion of variance explained by the grouping structure, provides a first estimate of whether a multilevel approach is appropriate (B. Johnson, 2010). The ICC is 0.39 for Abraxas and 0.35 for Silk Road 3.1 which justifies justifying the multilevel approach. Across the groups, most variance is found between vendors (0.51, 0.40), then among buyers (0.19, 0.21), categories (0.20, 0.18), and least is found between origin countries (0.05, 0.03). This hierar-

	Model 1: Silk Road 3.1	Model 2: Abraxas	Model 3: Silk Road 3.1 (w/ interaction)	Model 4: Abraxas (w/ interaction)
Predictors	$\beta$	$\beta$	$\beta$	$\beta$
Intercept	3.78 *** (3.54 – 4.02)	3.72 *** (3.50 – 3.95)	3.76 *** (3.52 – 4.00)	3.73 *** (3.50 – 3.95)
<i>Escrow (reference: Full escrow)</i>				
Finalize Early	0.14 *** (0.12 – 0.16)	0.21 *** (0.15 – 0.27)	0.14 *** (0.12 – 0.16)	0.21 *** (0.15 – 0.27)
50% Escrow	0.13 *** (0.11 – 0.15)		0.13 *** (0.11 – 0.15)	
Mixed Escrow	-0.02 (-0.07 – 0.03)	0.03 (-0.13 – 0.19)	-0.02 (-0.07 – 0.03)	0.03 (-0.13 – 0.19)
Guest user	0.04 *** (0.02 – 0.06)		0.04 *** (0.02 – 0.06)	
Unknown Escrow Status	-0.08 *** (-0.11 – -0.05)	0.40 *** (0.23 – 0.57)	-0.08 *** (-0.11 – -0.05)	0.40 *** (0.23 – 0.57)
Sample product (Reference: Not sample product)	-0.92 *** (-0.95 – -0.89)	-1.63 *** (-1.71 – -1.55)	-0.92 *** (-0.95 – -0.89)	-1.63 *** (-1.71 – -1.55)
log(Similar active products)	0.00 (-0.00 – 0.01)	0.00 (-0.02 – 0.03)	0.00 (-0.00 – 0.01)	0.00 (-0.02 – 0.03)
log(Positive ratings)	0.06 *** (0.05 – 0.07)	-0.04 ** (-0.07 – -0.01)	0.06 *** (0.06 – 0.07)	-0.03 * (-0.06 – -0.00)
log(Negative ratings)	-0.05 *** (-0.06 – -0.04)	0.02 (-0.01 – 0.06)	-0.06 *** (-0.07 – -0.05)	-0.01 (-0.05 – 0.04)
log(Vendor level)	0.04 *** (0.02 – 0.05)		0.05 *** (0.04 – 0.07)	
Silk Road League (Reference: Not Silk Road League)	-0.03 *** (-0.05 – -0.02)		-0.04 *** (-0.06 – -0.02)	
log(Sum of exchanges w/ vendor)	0.06 *** (0.05 – 0.06)	0.05 *** (0.04 – 0.06)	0.09 *** (0.08 – 0.10)	0.03 (-0.00 – 0.06)
log(Sum of exchanges w/ other vendors)	-0.00 *** (-0.01 – -0.00)	-0.02 *** (-0.03 – -0.01)	-0.00 *** (-0.01 – -0.00)	-0.02 *** (-0.03 – -0.01)
<i>Vendor Badge (reference: No badge)</i>				
Bronze vendor		0.23 *** (0.16 – 0.30)		0.20 *** (0.13 – 0.28)
Silver vendor		0.37 *** (0.27 – 0.47)		0.36 *** (0.25 – 0.46)
Gold vendor		0.36 *** (0.24 – 0.48)		0.35 *** (0.22 – 0.48)
log(Positive ratings) *			-0.00 *	-0.00
log(Sum of exchanges w/ vendor)			(-0.00 – -0.00)	(-0.01 – 0.00)
log(Negative ratings) *			0.01 ***	0.01 *
log(Sum of exchanges w/ vendor)			(0.00 – 0.01)	(0.00 – 0.02)
log(Level) *			-0.01 ***	
log(Sum of exchanges w/ vendor)			(-0.02 – -0.01)	
Silk Road League *			0.01	
log(Sum of exchanges w/ vendor)			(-0.00 – 0.01)	
Bronze vendor *				0.03
log(Sum of exchanges w/ vendor)				(-0.00 – 0.06)
Silver vendor *				0.02
log(Sum of exchanges w/ vendor)				(-0.01 – 0.06)
Gold vendor *				0.02
log(Sum of exchanges w/ vendor)				(-0.01 – 0.06)
Random Effects				
Residual variance	0.35	0.39	0.35	0.39
Between-group variance				
Buyer	0.19	0.21	0.19	0.21
Seller	0.51	0.40	0.51	0.40
Category	0.20	0.18	0.20	0.18
Origin	0.05	0.03	0.05	0.03
ICC	0.73	0.68	0.73	0.68
N				
Buyer	27114	3289	27114	3289
Seller	494	291	494	291
Category	26	26	26	26
Origin	22	23	22	23
N	99635	9108	99635	9108
Marginal $R^2$ /Conditional $R^2$	0.049 / 0.748	0.148 / 0.726	0.049 / 0.747	0.149 / 0.727

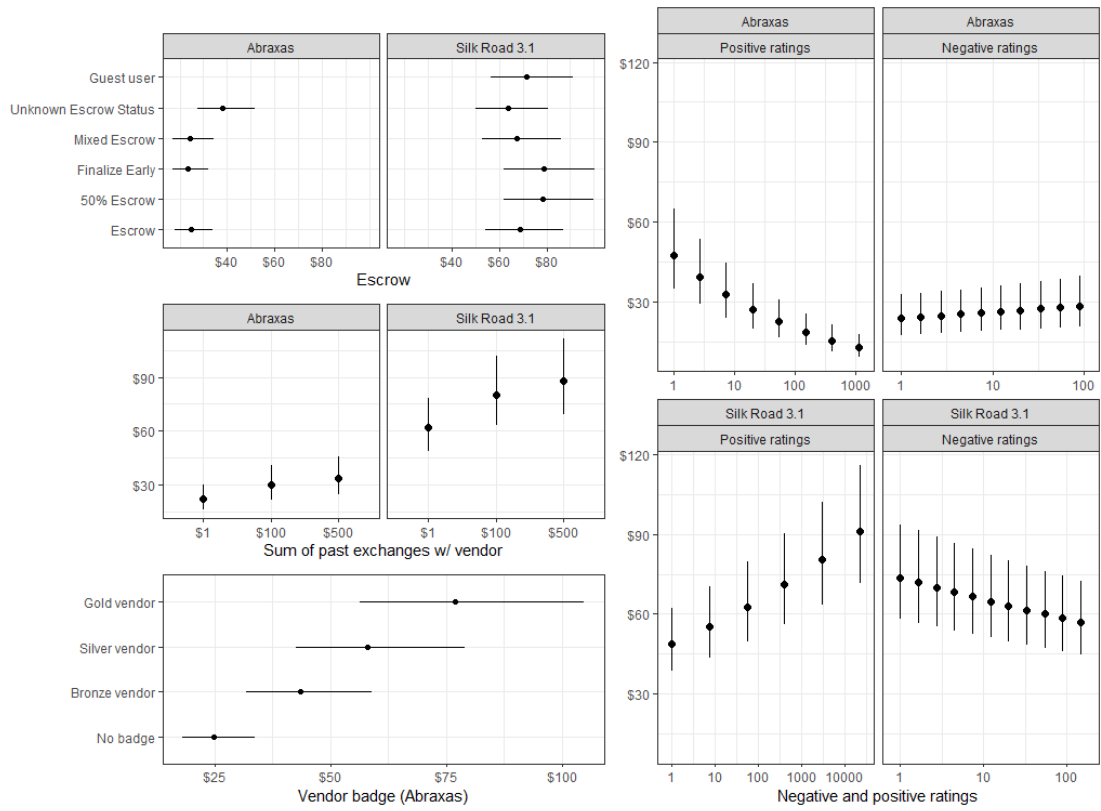
**Table 8.II** – Multilevel regression models with and without interaction terms. \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

chy of variance is similar in both markets, and corresponds to the variance across vendors, categories, and origins observed in past research (Demant, Munksgaard, Décary-Hétu, & Aldridge, 2018; Paquet-Clouston et al., 2018; Przepiorka et al., 2017). It is noted that the  $R^2$  of models is relatively high at the conditional level and low at the marginal level, that is, the fixed and random effects. Since quantity is the most important determinant of product price (Caulkins & Padman, 1993), and by extension transaction value, this hierarchy is expected. However, the goals of this paper cannot be achieved by including quantity in modeling since there is no reasonable scale to compare quantities across categories and many ads do not have an associated quantity.

### Fixed effects

Figure 8.2 plots predicted transaction sizes in USD holding all other variables at their mean or reference category to aid interpretation of coefficients. Beginning with models 1 and 2 and the control variables, products labeled as samples are on average sold at prices that are significantly lower ( $\beta = -0.92$ ,  $\beta = -1.63$ ,  $p < 0.001$ ). There is no significant association between the number of similar active products offered within the last 30 days and transaction value ( $\beta = 0.00$ ,  $p > 0.05$ ,  $\beta = 0.00$ ,  $p > 0.05$ ).

Models for both markets included the market-assigned status indicators, a badge on Abraxas, a vendor level and Silk Road League distinction on Silk Road 3.1. These represent the administrative approval of a vendor's performance, in line with the argument that market administrations support trust and coordination through authentication (Odabaş et al., 2017a). An increase in vendor level ( $\beta = 0.04$ ,  $p < 0.001$ ) is positively associated with the outcome, but the Silk Road badge is associated with a decrease ( $\beta = -0.03$ ,  $p < 0.01$ ). Conversely, on Abraxas, transactions with sellers that hold a gold- ( $\beta = 0.36$ ,  $p < 0.001$ ), silver- ( $\beta = 0.37$ ,  $p < 0.001$ ), or bronze vendor ( $\beta = 0.23$ ,  $p < 0.001$ ) badge are associated with larger transaction values. The predicted transaction sizes suggested by these estimates would be 37.6 (no badge), 47.6, 54.8, and 54.4 USD. It is noted, that the



**Figure 8.2** – Predicted transaction sizes at intervals holding all other variables at their mean or reference category.

distribution of these badges is not comparable between the two markets. Whereas only 42% of transactions on Abraxas are with gold vendors, 74.4% of transactions on Silk Road are with vendors labeled Silk Road League (see Table 8.I).

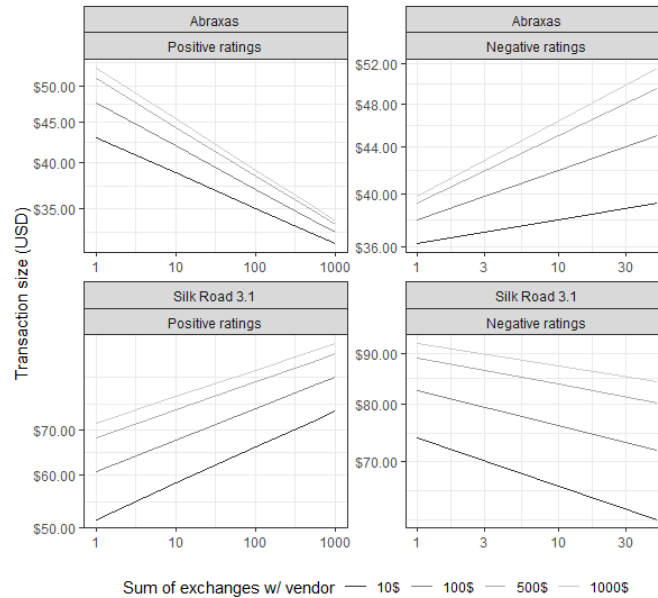
The administration's formal control over the transaction as a source of trust was included labeling transactions as using escrow, a variety thereof, or advance payment, known as FE or finalizing early (Moeller et al., 2017). Early finalization ( $\beta = 0.14, \beta = 0.21$ ), and partial (50%) escrow (only available on Silk Road 3.1,  $\beta = 0.13$ ) are all associated with significant increases in transaction value ( $p < 0.001$ ). Guest users on Silk Road 3.1, users who cannot leave a review or utilize escrow also tend toward slightly higher transaction values ( $\beta = 0.04, p < 0.001$ ). Unknown escrow status, transactions for which payment could not be determined, is positive on Abraxas ( $\beta = 0.40, p < 0.001$ ) with the opposite relation on Silk Road 3.1 ( $\beta = -0.08, p < 0.001$ ). cursory examination suggests it is attributable to products of unknown status sold on Abraxas being custom listings available only to specified buyers<sup>2</sup>.

The reputation system in cryptomarkets has been argued to support valuation and cooperation by allowing buyers to discriminate between trustworthy sellers and through exercising informal social control (Bakken et al., 2018; Odabaş et al., 2017a; Przepiorka et al., 2017). On Silk Road 3.1, reputation takes the expected direction, positive reputation being associated with an increase ( $\beta = 0.06, p < 0.001$ ) and negative reputation with a decrease ( $\beta = -0.005, p < 0.001$ ) in transaction value. However, on Abraxas the relation is inverse, with positive reputation associated with a decrease ( $\beta = -0.04, p < 0.01$ ), and negative reputation with an increase ( $\beta = 0.02, p > 0.05$ ).

The key contribution of this study is the inclusion of past exchange. For both markets, estimates are similar, significant ( $p < 0.001$ ) and relatively high for the sum of past exchanges with a vendor ( $\beta = 0.06, \beta = 0.05$ ). As both values are log-transformed, a 1% increase in the sum of past exchanges with a seller is estimated to increase transaction size by 0.06% or 0.05%. Holding all covariates at their mean

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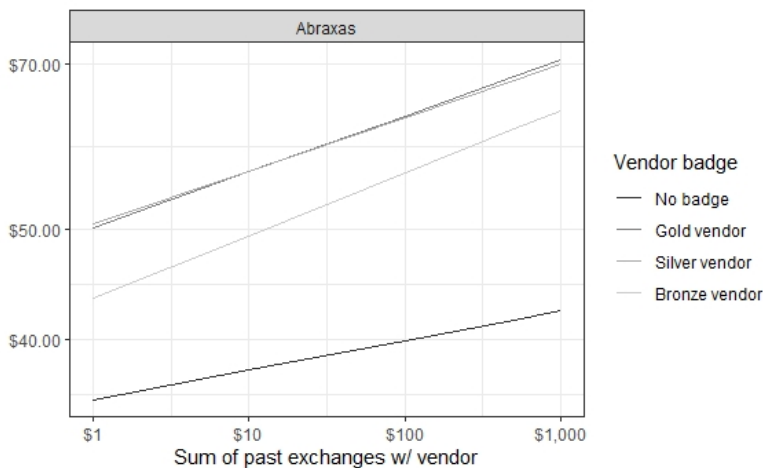
<sup>2</sup>The coding scheme only flagged products as custom listings if indicated.



**Figure 8.3** – Predicted transaction sizes. Y-axis shows the estimated transaction value, and X-axis the number of ratings. Each line represents the estimated effect of reputation at intervals of past exchanges w/ vendor (e.g. the estimated effect of positive ratings when a buyer has purchased for 100 USD with a seller before).

and reference, a buyer without an exchange history is estimated to make a purchase of 34.8 USD on Abraxas and 61.8 on Silk Road 3.1. Conversely, a buyer who has an exchange history with a seller amounting to 100 USD is estimated to spend 43.7 and 80.3 USD. There is a significant association ( $p < 0.001$ ) between the sum of past exchanges with other vendors, though it is weaker ( $\beta = -0.00, p = 0.02$ ).

Models 3 and 4 include interactions between the sum of past exchanges with a seller, status, and reputation to assess whether social ties moderate the effects of status and ratings. Figure 8.3 shows the estimated effect of positive and negative reputation across five values of the sum of past exchanges with a seller (10, 100, 500, and 1000 USD). On Abraxas, the an increase in past exchanges is associated with a larger negative effect of positive ratings ( $\beta = -0.00, p > 0.05$ ), whereas an increase in past exchanges is associated with a stronger positive effect of negative ratings ( $\beta = 0.01, p < 0.05$ ). On Silk Road 3.1, the interactions follow the same pattern: Increases in past exchange weaken the effect of positive feedback ( $\beta = -0.00, p >$



**Figure 8.4** – Predicted transaction sizes. X-axis is the sum of past exchanges with a seller. Lines represent intervals of status (vendor badge).

0.05), and weaken the negative effect of negative ratings ( $\beta = 0.01, p < 0.001$ ).

Figure 8.4 shows the interactions between vendor level and vendor badge, both set by the marketplace, and past exchange history. The Silk Road League badge is excluded, as it is both insignificant and any moderation is weak ( $\beta = 0.01, p > 0.05$ ). For vendor level on Silk Road, the direction suggests that the association between past exchange and transaction size is stronger when a seller has a lower ranking, and weaker when the seller has a high ranking ( $\beta = -0.01, p < 0.001$ ). Estimates for the presence of a vendor badge are insignificant but positive.

## 8.5 Discussion

Trust in illicit online markets is argued to be supported by three distinct mechanisms; reputation systems, informal social control by administrators, and social ties through repeated exchanges. Reputation effects are extensively documented with regards to price, sales, and choice of seller (Espinosa, 2019; Hardy & Norgaard, 2016; Nurmi et al., 2017; Przepiorka et al., 2017), but there is limited research on informal social control through authentication and mediation. Moreover, while all three sources of trust are typically operational, research tends to emphasize one or two, typically reputation and social ties (Duxbury & Haynie, 2018a, 2018b; Norbu-



tas et al., 2020a). Using transaction size, the amount in dollars and cents a buyer puts on the line, this study finds past exchanges with a seller are predictive of future exchanges, inconclusive effects of reputation, and conflicting evidence concerning the productive capacity of the administration.

Contrary to expectation (Hardy & Norgaard, 2016; Nurmi et al., 2017; Przepiorka et al., 2017), there are inconclusive associations between seller reputation and transaction size. However, reputation effects are not consistent across the literature on illicit online markets (see for example Červený & van Ours, 2019; Espinosa, 2019). Sample products are also exchanged at lower cost, which is a way to build trust that rests on the same reasoning (see also Ladegaard, 2018a). Following Odabaş et al. (2017a), the informal social control exercised by administrators was separated into authentication, the creation of a hierarchy of trustworthiness among sellers through status rankings, and mediation, the presence of escrow. With the exception of the Silk Road League badge, all status estimates are significant and positive. The varying estimates may reflect that the rankings on Abraxas allow more fine-grained discrimination than a binary indicator. These findings correspond to the position of criminologists, who have emphasized the productive capacity of administration (see also Dupont et al., 2016; Lusthaus, 2013; Odabaş et al., 2017b).

Outside-escrow transactions were found to be significantly larger in both markets. This is counter-intuitive, because the escrow system provides a primitive contract system (Diekmann & Przepiorka, 2019), and the finding has implications for assumptions about the necessity of institutional controls in illicit online exchange (e.g. Aldridge, Stevens, & Barratt, 2018a; Moeller et al., 2017). However, early finalization is typically a right granted to high-performing vendors, and it is possible that those who have accumulated a reputation for honesty switch to advance payment to reduce costs (Moeller & Sandberg, 2015), similar to how they may charge reputation premium (Hardy & Norgaard, 2016; Przepiorka et al., 2017). Finally, the absence of institutional controls does not imply the absence of governance (Granovetter, 2017, p. 69), since administrators still exercise significant

power (Odabaş et al., 2017b), and it should be noted that there are fully functional online drug markets without escrow (Bancroft et al., 2020).

Exchange relations have emerged as a source of trust in illicit online markets, but empirical research has been limited by the anonymization of data (Décary-Héту & Quessy-Doré, 2017). The criminological literature on market for stolen data and hacking, which through their organization as forums have a decidedly more social structure than cryptomarkets (Soudijn & Zegers, 2012), has discussed these social ties more in depth (Dupont et al., 2016; Yip, Shadbolt, & Webber, 2013). Recent research has started to excavate the function and relevance of these ties. A key finding has been the tendency towards repeated exchanges (Décary-Héту & Quessy-Doré, 2017; Duxbury & Haynie, 2018a, 2018b; Norbutas et al., 2020a). The positive relationship between past exchanges and transaction size further supports the contention that interpersonal trust is not rendered irrelevant by the constraints of anonymity (Décary-Héту & Quessy-Doré, 2017; Norbutas et al., 2020a). However, this study did not find evidence that these repeated exchanges drastically change the relevance of other sources of trust.

It is relatively well-established that cryptomarkets are found at the "last mile" of drug distribution (Demant, Munksgaard, Décary-Héту, & Aldridge, 2018; Dittus et al., 2018), but whether buyers are purchasing for personal use, social supply, or retail is uncertain. Overwhelmingly, most transactions are, as this study also shows, for relatively small amounts (Demant, Munksgaard, & Houborg, 2018). However, revenue is to a large extent driven by large purchases (Aldridge & Décary-Héту, 2016). The findings of this paper suggest that buyers increasingly purchase larger amounts, but it is likely there is some differentiation within buyers who purchase for different purposes (e.g. personal consumption, resale). All may start out making "test buys", but some may do so with the intent of purchasing much larger quantities. Given the data, it is difficult to separate buyer types, but future research can, with adequate data, exploit multilevel modeling further by examining between-buyer variance.

Illicit online markets remain a high priority for law enforcement agencies (Eu-

ropol, 2017; Europol/EC3, 2019). Several studies show that while platforms may be seized, new ones take over and activity is displaced rather than deterred (Décary-Héту & Giommoni, 2017; Ladegaard, 2018b, 2019a). Reputation transferability, the capacity of sellers to bring their identities to new platforms along with their reputation, has been posited as one of the reasons for this resilience (Ladegaard, 2020; Norbutas et al., 2020b). It is likely that a buyer’s trust in a seller is transferable as well, which may support the rapid stabilization following crackdowns (Soska & Christin, 2015). By extension, assuming even more intensive policing, these exchange relations can support markets going ”off-platform” through direct dealing organized through peer-to-peer communication (Childs, Coomber, Bull, & Barratt, 2020).

It is a truism that actors in illicit markets, in particular drug markets, rely on trust and informal social control in the absence of courts and regulation (Beckert & Wehinger, 2013; Moeller, 2018a). Illicit online markets appear to provide functional replacements (Luhmann, 1979) for the informal social control that support trust in traditional illicit markets through reputation systems and escrow (Jacques & Wright, 2011; Moeller & Sandberg, 2015). This study, along with a growing body of literature, suggests that trust is not only produced by administrators or reputation systems, but is produced through the accumulation of interpersonal experience (Granovetter, 1985). From this perspective, online drug markets come to resemble traditional drug markets more than at first glance: Despite their innovation, Beckert’s (2013, p. 17) claim that actors in illicit markets rely on ”pre-modern trust devices” holds even in disembedded settings.

## 8.6 Conclusion

Within this paper, I have built on a diverse interdisciplinary literature on trust in illicit online markets and examined the association between trust, reputation systems, informal social control exercised by administrators, and social ties. Using two unique datasets that allow the measurement of exchange relations, I find that

reputation and status hierarchies set by administrators are not consistently predictive of transaction size, while past exchanges with a drug seller are consistently positively associated with the size of future transactions. Surprisingly, findings also suggest that transactions outside institutional control are consistently larger. These findings have implications for continued enforcement actions against illicit marketplaces, which predominantly focus on dismantling platforms and subverting trust, a strategy which may be less effective if buyers are willing to trade outside escrow and trust is not contingent on the platform.

## CHAPTER 9

### A CHANGE OF EXPECTATIONS? GENERALIZING TRUST IN ILLCIT ONLINE DRUG MARKETS

*This paper is co-authored by Jason Ferris<sup>1</sup>, Monica Barratt<sup>2</sup>, Adam Winstock<sup>3</sup>, and Larissa J. Maier<sup>4</sup>. I extend my gratitude to the Global Drug Survey team for allowing me to utilize their data, their valuable comments, and feedback. I am especially grateful to Jason Ferris for discussions on the issues with non-committed responses and the treatment of Likert-scale data. The paper is currently in review at the International Journal of Drug Policy.*

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## Abstract

**Background:** Research suggests that trust in online drug markets – cryptomarkets – is based on reputation systems, repeated exchanges, governance, and social integration more broadly. Drawing on notions of institutional and abstract trust, we examine whether interaction with the institution itself is conducive to general expectations about product quality.

**Methods:** Using data from the 2018 Global Drug Survey ( $n = 25,471$ ) we utilize propensity score matching to explore causal associations between general beliefs in product quality on cryptomarkets and using cryptomarkets to purchase drugs. We apply multilevel linear regression to estimate the effect of purchasing drugs online on responses to four Likert-scale questions about beliefs in product value, purity, price, and weight.

**Findings:** We find strong evidence that using a cryptomarket is associated with significantly more positive beliefs in value, purity, price, and weight ( $\beta = 0.786, 0.758, 0.559, 0.667, p < 0.001$ ). While generally positive, these effects are not equally distributed across countries.

**Conclusion:** Our findings provide evidence that people who purchase drugs through cryptomarkets generalize individual experiences and build institutional trust. These findings further support a general sentiment in the literature that online drug markets provide higher-quality substances and services than their traditional counterparts. These findings contribute to the discussion of harm reduction and online drug markets.

## 9.1 Introduction

Problems of trust, especially with regards to product quality, are central to illicit markets (Beckert & Wehinger, 2013). Trust problems can constitute a barrier to attracting buyers and they increase transactional frictions (Moeller, 2018a). The problems of traditional face-to-face illicit exchanges are reproduced in online drug markets; information asymmetry, quality uncertainty, and opportunism. These are compounded by physical distance and anonymity (Moeller et al., 2017; Wehinger, 2011), but cannot be resolved by their traditional means; the social embeddedness of illicit trade, informal social control, and social norms (Moeller, 2018a). In this paper, we extend the literature on trust in online drug markets and examine whether interaction with the market institution produces abstract institutional trust. We focus on the issue of product, rather than cooperative, uncertainty, a problem we argue is more pressing for buyers. We therefore address a dual research gap, the problem of product uncertainty, and institutional trust in online drug markets. With an eye towards drug policy, we contribute to a discussion that has persisted since the first studies of online drug markets – their performance relative to offline markets (Aldridge et al., 2018a; Barratt, 2012; Martin, 2014a).

## 9.2 A primer on cryptomarkets

Cryptomarkets, also known as darknet markets (Broséus, Rhumorbarbe, et al., 2016) or anonymous online markets (Soska & Christin, 2015), first appeared in 2011. They have grown from a niche phenomenon into a stable, institutional form for illicit drug commerce (Martin et al., 2019; Tzanetakis, 2018b). Cryptomarkets function as other e-commerce platforms like eBay or Amazon. In exchange for commissions, they provide sellers and buyers with a platform for the distribution of drugs and other products, predominantly of an illegal nature (e.g. stolen data, hacking tools). Despite several website closures, either from administrators absconding with funds or seizure by law enforcement (Décary-Héту & Giommoni, 2017; Moeller et al., 2017), the economy has grown continually since 2011 (Tzanetakis, 2018a). With few

exceptions cryptomarkets have followed the same script as the first cryptomarket, Silk Road, launched in 2011: Markets offer escrow, use Tor to anonymize internet traffic, facilitate transactions using cryptocurrencies, and drugs are delivered by mail or as "dead drops" (Barratt & Aldridge, 2020; Christin, 2013).

Cryptomarket buyers often have wider experience of drug use than the general population (Barratt, Lenton, et al., 2016). They tend to be male, white, young, and relatively well-educated (Barratt et al., 2014; Van Hout & Bingham, 2013). Digital literacy and knowledge of technologies for anonymization and encryption are prerequisites to access these markets (Bancroft & Scott Reid, 2017). Compared to traditional modes of sourcing drugs offline, buyers report lower probabilities of encountering violence and predation (Barratt, Ferris, & Winstock, 2016). Qualitative and survey research suggests this may be an additional incentive in combination with higher drug quality (Barratt, Lenton, et al., 2016; Werse & Kamphausen, 2019). However, drug purchases, even in cryptomarkets, remain fraught with uncertainties for both buyer and seller (Moeller et al., 2017). Buyers are therefore faced with fundamental questions of who they can trust to supply product in a secure manner, to not be law enforcement, and to supply the advertised product.

### **9.3 Trust, expectation, and exchange**

Sztompka (1999) defines trust as a "bet on the future contingent actions of others" (p. 25). This definition captures distinct elements; an orientation towards the future, risk and potential harm, beliefs and expectations, rationality and emotionality, and action. This is a broad sociological definition of trust as an attitude towards the future, but it is reflective of general sentiments within the social sciences (Blomqvist, 1997; Lewis & Weigert, 1985; Rousseau et al., 1998). The social and psychological function of trust is to allow action oriented towards a future goal, while suspending concerns about potential harms – acting as if risk and doubt was nonexistent (Möllering, 2017). Trust is informed by a cognitive process which takes factors like reputation and experience into account (Lewis & Weigert, 1985). The



social function of trust is complexity reduction, allowing individuals to act as if others will abide by expectations (Luhmann, 1979). This does not mean that trust is uniformly good since naivete is exploitable (Hardin, 1993). However, an expectation that others are honest can be socially productive because it supports cooperation and social cohesion (Misztal, 1996). Alternatively, expecting others to be untrustworthy encourages costly and cumbersome functional alternatives, for example corruption or excessive litigation, to achieve the desired actions of others (Sztompka, 1999, p. 117).

Sztompka (1999) suggests the notion of concentric circles of trust that extend from near and concrete ties of family and friendship towards abstract objects like social roles or institutions (p. 41-43). Misztal (1996) makes a similar distinction, separating interpersonal and abstract trust. Importantly, beliefs in abstract institutions support cooperative behavior (McEvily et al., 2012). Trust is frequently built through social interaction (Granovetter, 1985), and this function may be generalized to institutions (Carlsson et al., 2018).

In the context of economic exchange, problems of trust can be separated across two axes: cooperation and product (Dimoka et al., 2012). In this sense, uncertainty about the *performance* of the seller and *quality* of their product are distinct (Schilke et al., 2016). In this paper we concern ourselves with the latter.

#### **9.4 Illicit online markets and problems of trust**

The fundamental trust problems of illicit markets are reproduced in online drug markets: There is information asymmetry, opportunism is unrestrained by legal institutions, product is unstandardized, and cannot be sampled or inspected before purchase (Akerlof, 1970; Beckert & Wehinger, 2013; Tzanetakis et al., 2016). Concerns about product quality, which we concern ourselves with, are justified by accumulating evidence that adulteration and false advertising persist in cryptomarkets (Moeller et al., 2017; Quintana et al., 2017). This uncertainty grows in complexity, because chemical purity and perceived quality are not necessarily

correlated (Bancroft & Reid, 2016). These complexities are compounded because opportunism is no longer restrained by informal social control, and exchange is socially disembodied (Bakken et al., 2018). In other words, the trust problems of illicit markets persist online, but without the traditional means to resolve them.

Research suggests that trust and cooperation in online drug markets is supported by distinct mechanisms and social processes. These may be seen as functional replacements (Luhmann, 1979) to the social networks and informal control of traditional illicit markets (Moeller, 2018a). Duxbury and Haynie (2018a); Norbutas et al. (2020a) highlight tendencies towards repeated exchanges, as in traditional modes of drug distribution (Moeller, 2018a; Scott et al., 2017). Przepiorka et al. (2017) and Hardy and Norgaard (2016) stress the centrality of the reputation system in which buyers review sellers (see also Bakken et al., 2018; Tzanetakis et al., 2016). These studies draw attention to cooperation as an expression of trust (e.g. sales, price, loyalty). In quantitative research on illicit online markets cooperation is therefore a measure of trust, but simultaneously also the means for building interpersonal trust. Conversely, theoretically and qualitatively oriented work has taken more holistic approaches drawing attention to governance (Lusthaus, 2012; Odabaş et al., 2017a), or social processes of interaction (Bancroft et al., 2020; Kamphausen & Werse, 2019). Finally, the capacity of some sellers to provide chemical tests of their drugs as a signal of quality has also been observed (Caudevilla et al., 2016).

## 9.5 Research design

In the preceding sections we have introduced the problem of product uncertainty and the notion of trust in abstract others. We have suggested that the bayesian process that undergirds trust (Hardin, 1993) may be generalized to the market institution itself, drawing on concepts of institutional and abstract trust. Similar to how trust in individual sellers can be produced through repeated exchanges, we suggest institutional trust can be produced through interaction with the marketplace as an institution (Zucker, 1986). Since past research suggests cryptomarket

buyers hold positive beliefs, and there is some evidence of better institutional performance relative to offline markets, we suggest these beliefs will be positive. We propose that a fundamental causal process, in which attaining and accumulating information, *experience*, is central to the formation of beliefs. This supports the following hypotheses:

1. Respondents who purchase drugs via cryptomarkets (buyers) will hold more firm general beliefs about product quality than those who do not use cryptomarkets (non-cryptomarket-buyers).
2. The general beliefs of respondents who purchase drugs using cryptomarkets will be more positive than those who do not use cryptomarkets.

We test these propositions using data from the 2018 Global Drug Survey (GDS) which has been tracking cryptomarkets since 2012. In GDS2018 we included a specialist section exploring motivations, experiences and beliefs around cryptomarket transactions (using the colloquial term "darknet market"). Using specific and directed questions in studies of abstract and institutional trust is recommended (Carlsson et al., 2018), and each question probed the respondent's belief in product quality (value, weight, purity, and price). This constitutes an attitudinal, not behavioral, measure of trust (McEvily et al., 2012). Respondents to GDS2018 rated their agreement to four 6-item Likert-scale statements concerning perceived product quality on cryptomarkets. The statements are as such:

1. *For the same drug type, weight and purity, darknet market drug deals are usually better value for money than street or dealer sourced drugs.*
2. *A 1 gram purchase from darknet markets is more likely to weigh the full 1 gram than a '1 gram' purchase from dealers or street.*
3. *Darknet market drugs are usually of higher purity than street or dealer sourced drugs.*
4. *Darknet market prices are usually higher than street or dealer prices.*

## 9.6 Methods and data

Global Drug Survey (GDS) runs the world's largest drug survey. GDS conducts annual cross-sectional surveys using an encrypted online survey platform. Participants are self-selected and thus GDS obtains a non-probability sample. Under the assumption that conditional on covariates, treatment assignment is essentially random, propensity score matching approximates randomization and allows us to posit a stronger case for causality (Apel & Sweeten, 2010). We apply propensity score matching as pre-processing and analyze the matched data using multilevel linear regression to provide estimates of how beliefs differ between buyers and non-buyers (Ho, Imai, King, & Stuart, 2007; Stuart, 2010). Because the GDS is a non-probability sample, the dataset should not be considered representative (Barratt et al., 2017). Our aim is to estimate the difference in beliefs between buyers and non-buyers, which does not necessitate a representative sample of the population of people who use drugs. Rather, a comparable sample of non-cryptomarket-buyers, a control, is needed.

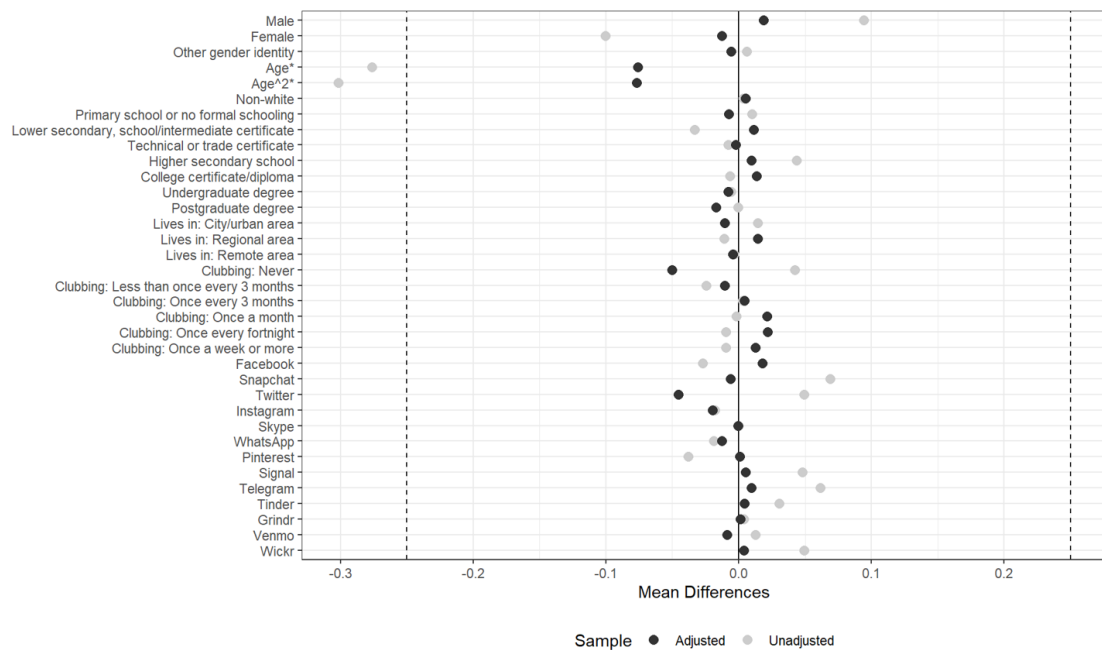
Practically, matching entails the creation of a control group which is balanced across covariates. The propensity score is therefore a "balancing score" (Apel & Sweeten, 2010). It is typically estimated using logistic regression with the "treatment condition" being the outcome (in this case being a buyer). When matching, traditional concerns such as multicollinearity, model fit, significance and parsimony are not primary concerns. Rather, the aim is to approximate randomization through covariate balancing (Stuart, 2010). Ideally, such a model can be derived from theory and a body of literature. A final concern is unmeasured confounding variables. However, if these confounding variables are correlated with the balanced covariates, these are argued to be indirectly included (Apel & Sweeten, 2010). For example, matching that includes an urban/regional/urban distinction, as ours do, is likely to implicitly include access to street markets in urban areas.

### 9.6.1 Data

76,984 respondents from 182 countries completed screening questions for the darknet market module in the 2018 Global Drug Survey (GDS) questionnaire (GDS2018). We restrict our sample of buyers to those who have used cryptomarkets within the preceding 12 months, either by purchasing themselves or through someone else. The control group is matched from 21,984 respondents who have heard about cryptomarkets. The former limits our sample to recently treated which is preferable for matching. We further drop all responses with missing values in any of the variables used in the analysis. The GDS survey is unbalanced across countries, and we include only 33 countries which have 50 respondents or more. This restriction aids convergence when estimating multilevel regression models, specifically for the robustness tests, and restricts the analysis of group-level variation to countries where informative estimates can be produced. The final dataset used for matching consists of 25,471 respondents from 33 countries of which 2,146 (8.43%) have used a cryptomarket themselves, and 1,341 (5.26%) had an intermediary purchase for them. These buyers have on average made 11 purchases ( $SD = 18.3$ ) with a median of 5 purchases throughout their entire career. We refer to the control group as non-buyers to specify they have not purchased drugs through a cryptomarket.

### 9.6.2 Matching

GDS respondents are nested within countries which will correlate with usage of cryptomarkets (Barratt et al., 2014). This bias may be reduced by incorporating grouping structure into matching (Arpino & Cannas, 2016). We therefore use preferential within-country matching implemented in the *CMatching* library in R (Cannas, 2019). Each cryptomarket user was matched with a non-user on the basis of their country, and age (linear and curvi-linear), gender, nightlife/clubbing frequency, and recent technology usage. We exclude the use of drug-related forums and reddit, Tor, Bitcoin and PGP as each might involve conditioning on the treatment (Bancroft & Reid, 2016). Because drug use may increase after using



**Figure 9.1** – Standardized mean differences in matched (adjusted) and unmatched (unadjusted) samples. Continuous predictors marked with asterisk.

a cryptomarket, we do not include it. For transparency, we show estimates for a model that includes drug use, referring to the two models as "strict" (no drug use) and "loose" (including drug use).

The caliper is the upper bound of a match. We use a caliper of 0.2 standard deviations of a covariate (Benedetto, Head, Angelini, & Blackstone, 2018). Using preferential within-country matching for both the strict and loose model, 2 and 16 respondents from the treated group were left unmatched, with 2.5% and 3.2% being matched outside their country. Whether covariate balance has been achieved may be assessed based on the standardized mean difference (SMD). This entails dividing the difference in means and with the standard deviation for each variable in the two groups (Zhang, Kim, Lonjon, & Zhu, 2019). Shown in Table 9.I and Figure 9.1, all variables are within an acceptable threshold of 0.25 after matching (Stuart, 2010).

Variable	Type	Unadjusted	Adjusted
Gender:			
Male	Binary	0.0941342	0.0168331
Female	Binary	-0.1003320	-0.0111270
Other gender identity	Binary	0.0061978	-0.0057061
Age	Contin.	-0.2762661	-0.0942265
Age <sup>2</sup>	Contin.	-0.3014653	-0.0952076
Non-white	Binary	0.0035736	0.0025678
Education			
Primary school or no formal schooling	Binary	0.0098957	-0.0042796
Lower secondary, school/intermediate certificate	Binary	-0.0329844	0.0168331
Technical or trade certificate	Binary	-0.0079332	-0.0014265
Higher secondary school	Binary	0.0437060	0.0045649
College certificate/diploma	Binary	-0.0064573	0.0011412
Undergraduate degree	Binary	-0.0057807	0.0025678
Postgraduate degree	Binary	-0.0004461	-0.0194009
Lives in:			
City/urban area	Binary	0.0145397	-0.0253923
Regional area	Binary	-0.0110393	0.0248217
Remote area	Binary	-0.0035003	0.0005706
Clubbing:			
Never	Binary	0.0423161	-0.0482168
Less than once every 3 months	Binary	-0.0246406	-0.0151213
Once every 3 months	Binary	0.0032061	0.0071327
Once a month	Binary	-0.0018152	0.0276748
Once every fortnight	Binary	-0.0096569	0.0231098
Once a week or more	Binary	-0.0094095	0.0054208
Apps used within last week:			
Facebook	Binary	-0.0270029	0.0199715
Snapchat	Binary	0.0689503	-0.0085592
Twitter	Binary	0.0495209	-0.0350927
Instagram	Binary	-0.0179389	-0.0134094
Skype	Binary	-0.0002030	0.0028531
WhatsApp	Binary	-0.0187484	-0.0105563
Pinterest	Binary	-0.0381701	-0.0039943
Signal	Binary	0.0478813	0.0048502
Telegram	Binary	0.0615029	0.0028531
Tinder	Binary	0.0306030	0.0017118
Grindr	Binary	0.0040856	0.0017118
Venmo	Binary	0.0127775	-0.0077033
Wickr	Binary	0.0491929	0.0034237

**Table 9.I** – Balance scores for strict model: Standardized mean difference for unadjusted and adjusted samples.

### 9.6.3 Statistical analysis

Table 2 shows the 4 Likert-scale items, descriptive statistics for the responses on the original scale and two reduced scales. How to treat Likert-scale responses is a longstanding debate within the social sciences (Carifio & Perla, 2008). Some argue that Likert-scale responses can be treated as discrete interval variables, and thus analyzed within an OLS framework, while others argue that the scale is inherently ordinal, maybe even nominal, and should be analyzed using categorical methods (Norman, 2010). Analyzing nested data further complicates this. We make several choices which we proceed to discuss.

In line with our theoretical framework, we consider certainty as a continuum from negative to positive beliefs. Responses to the statements may be seen as attitudes towards products on cryptomarkets. Table 9.II shows that non-buyers predominantly answer *don't know/unsure*, though there are also buyers with the same opinion, and non-buyers who express negative and positive beliefs. A lack of personal experience does not imply one cannot hold beliefs, but that it is more likely that one will opt out by stating *don't know/unsure*. We consider this response as similar to a neutral response; no firm belief in either direction. We note that there is often a systematic difference between a neutral response and opting out by responding *don't know/unsure* (Blasius & Thiessen, 2001). Because the response is predominantly chosen by those with no experience, we suggest this is a reflection of just that - respondents have no firm beliefs, thus justifying its treatment as a neutral response. While we believe it is an untenable position to simply exclude these answers, if they reflect a lack of experience, we briefly discuss the results of estimating models excluding the group in our analysis.

We create a discrete outcome in which -2 is strongly disagreeing, 0 is neutral and *don't know/unsure*, and 2 is strongly agreeing with the proposition. This makes an easily interpretable scale. In the original survey the last question concerning price was phrased negatively, but since the scale is symmetrical we invert it. To assess the robustness of our conclusions, we further create a binary outcome in which



	Has not used a cryptomarket	Has used cryptomarket within last 12 months
N	21.950	3.521
<b>Value:</b>		
Original scale (%)		
Strongly disagree	263 (1.2)	73 (2.1)
Disagree	586 (2.7)	102 (2.9)
Neutral	2105 (9.6)	342 (9.7)
Agree	3953 (18.0)	1037 (29.5)
Strongly agree	1911 (8.7)	1690 (48.0)
Don't know / unsure	13132 (59.8)	277 (7.9)
Continuous scale (mean (SD))	0.30 (0.71)	1.18 (0.96)
Agree/strongly agree (%)	5864 (26.7)	2727 (77.4)
<b>Purity:</b>		
Original scale (%)		
Strongly disagree	241 (1.1)	58 (1.6)
Disagree	788 (3.6)	109 (3.1)
Neutral	1978 (9.0)	309 (8.8)
Agree	4479 (20.4)	1108 (31.5)
Strongly agree	1922 (8.8)	1654 (47.0)
Don't know / unsure	12542 (57.1)	283 (8.0)
Continuous scale (mean (SD))	0.32 (0.73)	1.19 (0.93)
Agree/strongly agree (%)	6401 (29.2)	2762 (78.4)
<b>Price:</b>		
Original scale (%)		
Strongly disagree	1326 (6.0)	1269 (36.0)
Disagree	3487 (15.9)	1092 (31.0)
Neutral	1767 (8.1)	335 (9.5)
Agree	1410 (6.4)	324 (9.2)
Strongly agree	460 (2.1)	214 (6.1)
Don't know / unsure	13500 (61.5)	287 (8.2)
Continuous scale (mean (SD))	0.17 (0.72)	0.82 (1.19)
Agree/strongly agree (%)	4813 (21.9)	2361 (67.1)
<b>Weight:</b>		
Original scale (%)		
Strongly disagree	292 (1.3)	59 (1.7)
Disagree	817 (3.7)	129 (3.7)
Neutral	2027 (9.2)	424 (12.0)
Agree	4318 (19.7)	1090 (31.0)
Strongly agree	1700 (7.7)	1453 (41.3)
Don't know / unsure	12796 (58.3)	366 (10.4)
Continuous scale (mean (SD))	0.29 (0.72)	1.06 (0.96)
Agree/strongly agree (%)	6018 (27.4)	2543 (72.2)

**Table 9.II** – Distribution of Likert-scale responses. Price beliefs are inverted in the dichotomized and continuous transformations.

beliefs are dichotomized in the hypothesized direction (e.g., agreeing or strongly agreeing that cryptomarkets are superior). Table 9.II suggests that respondents who have heard about cryptomarkets hold above neutral expectations, but predominantly express uncertainty. Conversely, those who have used a market are more certain and positive. A test of means or a non-parametric group comparison, even after matching, is not ideal because respondents are grouped in countries and it is reasonable to expect some country-level variation. Statistical analysis should therefore balance informativeness and the grouped structure of the data. Our compromise is to apply and present multilevel linear regressions (Gelman & Hill, 2007). As the response options are symmetrical and ordered we believe this approach is justifiable (Carifio & Rocco, 2007). To assess robustness, we reanalyzed data under different specifications. We estimated multilevel logistic and ordinal regressions both using the matched data including and excluding *don't know/unsure* responses pre-matching. We briefly discuss the results later.

## 9.7 Findings

After matching we apply multilevel linear regression to estimate the effect of using a cryptomarket on beliefs. Using matching as pre-processing for regression is preferred over comparing means post-matching. This is also known as a "doubly robust" approach correcting for residual variance and prognostic covariates (Apel & Sweeten, 2010; Ho et al., 2007). Statistical analysis was conducted in R taking advantage of the *lme4* and *ggeffects* packages (Bates et al., 2015; Lüdtke, 2018a). We begin by presenting our model, after which we summarize the fixed effects. Hereafter we discuss the difference in beliefs between the group of buyers and the control group. Table 9.III shows descriptive statistics for the matched sample across the covariates used in the regression models.

We estimate a model for each Likert-item wherein the outcome is the scaled belief shown in Table 9.II. Analyzing grouped data using regular OLS violates the assumption of uncorrelated error terms. We therefore allow a random intercept

	Unmatched data	Matched data
N	25471	7010
Has used DNM within last 12 months (%)	3521 (13.8)	3505 (50.0)
Age	25.6 (8.82) (16 – 79)	24.2 (7.26) (16 – 71)
Gender (%)		
Male	18992 (74.6)	5725 (81.7)
Female	6181 (24.3)	1145 (16.3)
Other gender identity	298 (1.2)	140 (2.0)
Non-white (%)	2099 (8.2)	580 (8.3)
Education (%)		
Primary school or no formal schooling	933 (3.7)	340 (4.9)
Lower secondary, school/intermediate certificate	3444 (13.5)	711 (10.1)
Technical or trade certificate	2272 (8.9)	584 (8.3)
Higher secondary school	5450 (21.4)	1724 (24.6)
College certificate/diploma	6023 (23.6)	1574 (22.5)
Undergraduate degree	5849 (23.0)	1606 (22.9)
Postgraduate degree	1500 (5.9)	471 (6.7)
Lives in (%)		
City/urban area	17954 (70.5)	5066 (72.3)
Regional area	6384 (25.1)	1639 (23.4)
Remote area	1133 (4.4)	305 (4.4)
Clubbing (%)		
Never	4012 (15.8)	1520 (21.7)
Less than once every 3 months	4780 (18.8)	1205 (17.2)
Once every 3 months	3496 (13.7)	968 (13.8)
Once a month	5176 (20.3)	1341 (19.1)
Once every fortnight	4726 (18.6)	1171 (16.7)
Once a week or more	3281 (12.9)	805 (11.5)
N social media apps used last week		3.48 (1.52) (1 – 13)
Apps used within last week:		
Facebook (%)	21745 (85.4)	
WhatsApp (%)	15480 (60.8)	
Instagram (%)	14435 (56.7)	
Snapchat (%)	10958 (43.0)	
Twitter (%)	5713 (22.4)	
Skype (%)	3947 (15.5)	
Telegram (%)	3410 (13.4)	
Tinder (%)	3184 (12.5)	
Pinterest (%)	2234 (8.8)	
Signal (%)	989 (3.9)	
Wickr (%)	490 (1.9)	
Venmo (%)	414 (1.6)	
Grindr (%)	395 (1.6)	

**Table 9.III** – Descriptive statistics for unmatched data and matched data. For continuous predictors mean, SD, and range are shown. For categorical predictors  $n$  and percentage is shown. Only predictors included in matching and regression are shown.

for each country to account for country-level variance. We further allow the effect of being a buyer to vary as well, under the advice to utilize the maximal random effect structure when possible (Harrison et al., 2018). Except in the case of beliefs about weight, the sample composition allowed us to fit this structure. We fit models similar to our matching process with minor modifications. For parsimony we include an index of the apps used, rather than a binary indicator for each. As before, we include clubbing, education, where the respondent lives, age, gender and ethnicity. Since beliefs are scaled from -2 to 2, coefficient estimates for both fixed and random effects can be interpreted straightforwardly: An estimate of 0.5 suggests an increase in beliefs from the intercept that corresponds to half a point where 1 is an increase from e.g. agree to strongly agree.

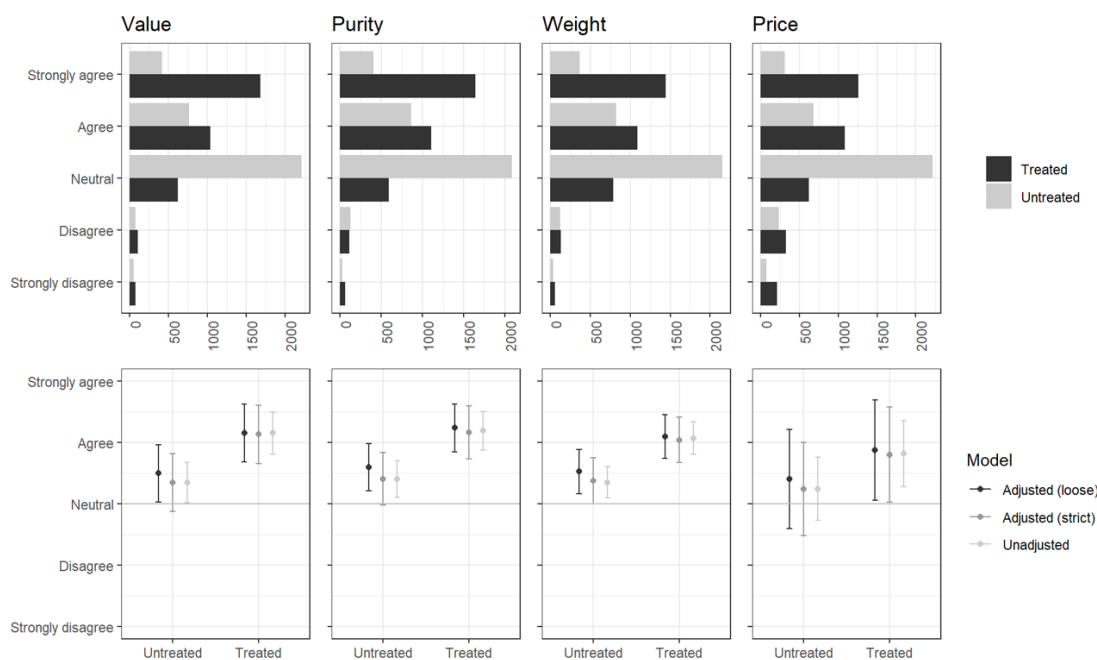
Across all four models we observe that social media use, gender, and age follow consistent patterns. We find that women, compared to men, express significantly less positive beliefs in value, purity, and weight ( $\beta = -0.185, -0.227, -0.235, p < 0.001$ ). A similar trend, though insignificant, is observed for price ( $\beta = -0.058, p > 0.05$ ). Respondents identifying neither as male nor female exhibit the same tendency ( $\beta = -0.165, -0.253, -0.118, -0.206$ ), though estimates are only significant for value ( $p < 0.05$ ) purity ( $p < 0.001$ ) and weight ( $p < 0.01$ ). We also find that younger respondents consistently tend to harbor more positive sentiments ( $p < 0.001$ ), with 1-year increase in age being associated with a decrease in beliefs ranging from -0.007 to -0.014. We observe positive but insignificant estimates for social media.

### 9.7.1 Differences in beliefs

After matching and adjusting for covariates we observe large and significant differences between buyers and the control group: The control group, non-buyers, has a perception of cryptomarkets that is slightly above neutral, while buyers express more positive sentiments in the range of *Agree* on average. As discussed previously, we re-coded *don't know/unsure* responses as neutral (0) and these are predominantly the response chosen among non-buyers. This confirms our first hy-

	Value	Purity	Price	Weight
<b>Predictors</b>				
Intercept	0.538*** (0.388 – 0.688)	0.605*** (0.456 – 0.754)	0.583*** (0.417 – 0.749)	0.521*** (0.369 – 0.672)
Has used cryptomarket within last 12 months (Reference: No)	0.786*** (0.691 – 0.882)	0.758*** (0.667 – 0.849)	0.559*** (0.403 – 0.714)	0.667*** (0.627 – 0.707)
Gender (Reference: male):				
Female	-0.185*** (-0.239 – -0.130)	-0.227*** (-0.280 – -0.173)	-0.058 (-0.119 – 0.003)	-0.235*** (-0.289 – -0.180)
Other gender identity	-0.165* (-0.308 – -0.021)	-0.253*** (-0.393 – -0.112)	-0.118 (-0.278 – 0.042)	-0.206** (-0.350 – -0.062)
Age	-0.009 *** (-0.012 – -0.006)	-0.010*** (-0.013 – -0.006)	-0.014*** (-0.017 – -0.010)	-0.007*** (-0.010 – -0.004)
Education (Reference: Primary school or no formal schooling):				
Lower secondary, school/intermediate certificate	0.008 (-0.107 – 0.123)	0.044 (-0.069 – 0.157)	-0.075 (-0.203 – 0.054)	0.003 (-0.113 – 0.118)
Technical or trade certificate	0.049 (-0.070 – 0.168)	0.042 (-0.075 – 0.159)	0.003 (-0.130 – 0.136)	-0.010 (-0.129 – 0.110)
Higher secondary school	0.067 (-0.036 – 0.169)	0.056 (-0.044 – 0.157)	-0.017 (-0.132 – 0.097)	0.054 (-0.049 – 0.157)
College certificate/diploma	0.149 ** (0.041 – 0.257)	0.113* (0.008 – 0.219)	0.070 (-0.050 – 0.191)	0.101 (-0.008 – 0.209)
Undergraduate degree	0.139 * (0.031 – 0.247)	0.116* (0.010 – 0.222)	0.025 (-0.096 – 0.145)	0.097 (-0.012 – 0.205)
Postgraduate degree	0.085 (-0.043 – 0.213)	0.105 (-0.021 – 0.231)	-0.054 (-0.197 – 0.089)	0.116 (-0.012 – 0.245)
Lives in (Reference: Urban area):				
Regional area	-0.014 (-0.063 – 0.035)	-0.018 (-0.066 – 0.030)	-0.000 (-0.055 – 0.054)	-0.010 (-0.059 – 0.040)
Remote area	-0.048 (-0.149 – 0.052)	-0.105* (-0.203 – -0.006)	-0.016 (-0.128 – 0.097)	-0.104* (-0.205 – -0.003)
Clubbing (Reference: Never):				
Less than once every 3 months	-0.009 (-0.078 – 0.060)	-0.008 (-0.075 – 0.060)	-0.064 (-0.141 – 0.013)	-0.047 (-0.116 – 0.022)
Once every 3 months	-0.028 (-0.102 – 0.046)	-0.065 (-0.138 – 0.007)	0.058 (-0.024 – 0.141)	-0.039 (-0.114 – 0.035)
Once a month	0.008 (-0.061 – 0.077)	-0.024 (-0.092 – 0.044)	0.071 (-0.006 – 0.148)	0.017 (-0.053 – 0.086)
Once every fortnight	-0.001 (-0.075 – 0.072)	-0.015 (-0.087 – 0.057)	0.010 (-0.072 – 0.092)	0.007 (-0.067 – 0.081)
Once a week or more	-0.044 (-0.124 – 0.037)	-0.054 (-0.134 – 0.025)	0.089 (-0.001 – 0.179)	-0.092* (-0.174 – -0.011)
N social media apps used (7 days)	0.011 (-0.003 – 0.025)	0.011 (-0.002 – 0.025)	-0.003 (-0.018 – 0.013)	0.008 (-0.006 – 0.022)
<b>Random Effects</b>				
Residual variance	0.71	0.69	0.89	0.72
Between-country variance	0.03	0.03	0.03	0.03
Treatment variance	0.04	0.04	0.16	
Intercept-slope correlation	0.12	-0.11	0.49	
N (countries)	33	33	33	33
Observations	7010	7010	7010	7010
Marginal $R^2$ / Conditional $R^2$	0.180 / 0.237	0.179 / 0.229	0.086 / 0.214	0.144 / 0.180

**Table 9.IV** – Results from multilevel linear regression. 95% confidence intervals based on SE. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

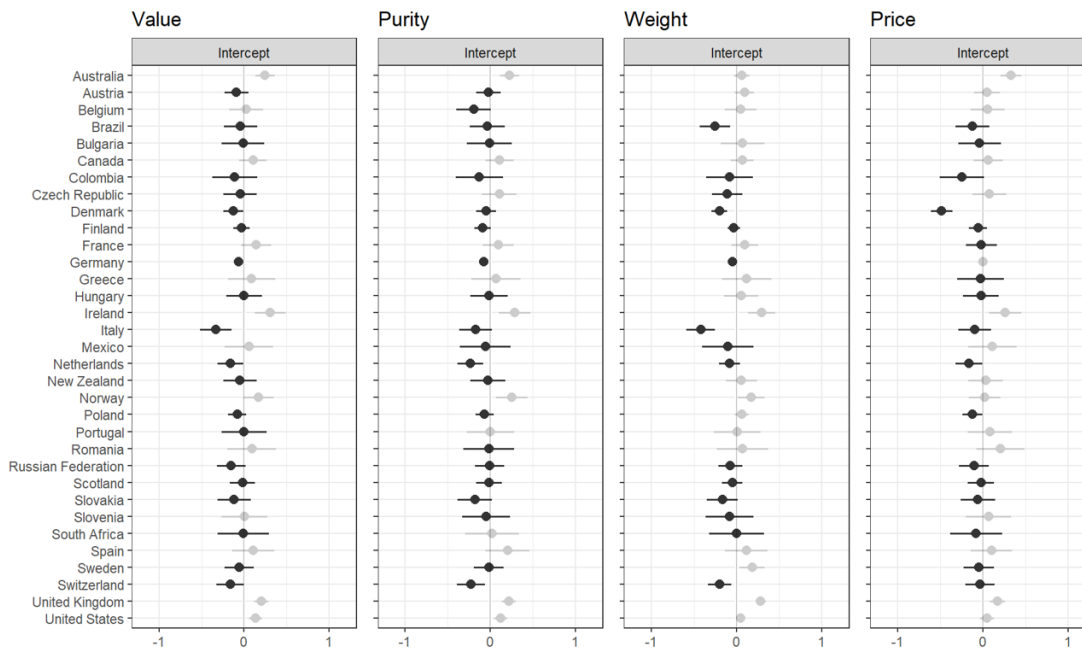


**Figure 9.2** – Top: Distribution of responses in matched treatment and control group. Bottom: Estimated increase in beliefs holding all covariates at their mean or reference category. The estimated effects account for random effect variance.

pothesis, that buyers express more certain and firm beliefs. The difference in beliefs is significant in all cases ( $p < 0.001$ ), ranging from 0.559 to 0.786. This pattern is evident from simple means and remains in regressions. Raw comparisons of responses and estimated effects are shown in Figure 9.2. These findings support our second hypothesis: Respondents who have purchased drugs on cryptomarkets express more positive beliefs.

The effect on price is markedly weaker than for purity, value and weight, and confidence intervals are larger. We also find markedly less explanatory power at the fixed effect level for price (marginal  $R^2 = 0.086$ ). While there are no comparative studies concerning weight, purity, or value on cryptomarkets, country-level variation in prices is reproduced on cryptomarkets (Cunliffe et al., 2017). If prices vary extensively, this is likely reflected in the smaller estimate and larger variation.

For all four models we allow the intercept of beliefs to vary across countries. Figure 9.3 shows the country-level intercepts, and some systematic tendencies may



**Figure 9.3** – Group-level intercepts across countries.

be observed. For example, all four beliefs are on average lower in the Netherlands and Italy. Country-level variance suggests variance is similar across countries (0.03). For value, purity, and price we allow the effect of the treatment to vary as well. We observe a positive correlation for value and price (0.12, 0.49), and a negative correlation for purity (-0.11). A positive correlation suggests that the effect is larger in countries wherein trust among the control group is higher. For example, Italian respondents are estimated to hold a belief in value that is 0.33 points lower, and the effect of treatment is -0.40 points weaker. Conversely, French respondents are 0.14 points above the mean, and using a cryptomarket is estimated to increase beliefs by an additional 0.11 points.

To assess the robustness of our models, we estimated models using logistic and ordinal regressions. In the former, we estimated the probability of expressing positive beliefs, and in the latter the probability of expressing more positive beliefs. In both cases, we find the same direction and sign of the predictors. We also assessed models in which we excluded *don't know/unsure* responses to the Likert

questions, and matched on a smaller sample. Across all specifications we observed the same patterns as above for age, gender, and social media use. Similarly, an increase in general positive expectations in the buyer group remained significant and proportional. We also found that removing *don't know/unsure* responses led to a higher intercept, between 0.78 and 0.96, and a weaker effect of using a cryptomarket between 0.33 and 0.49 ( $p < 0.001$ ).

## 9.8 Discussion

Our findings have implications for both policy and the understanding of illicit online markets. We discuss each in turn, after drawing attention to questions posed by our findings and methods. Matching seeks to approximate randomization, but we limit our claims of causality to suggestive, rather than definite, to err on the side of caution. This reservation is rooted in the variation in beliefs across country and gender. Trust is transitive and transferable, and the word of a trusted friend carries more weight than that of a stranger (Glückler & Armbrüster, 2003). If a country has a high rate of adoption, the probability of knowing someone who has had a positive interaction with a cryptomarket increases – a reputation or network effect (Sztompka, 1999, p. 71). This also provides an explanation for the positive beliefs among non-buyers. However, the interpretation of Likert-scales may vary across cultures and nations (Lee, Jones, Mineyama, & Zhang, 2002). Concerning gender differences, we draw attention to two limitations. First, we do not know whether respondents have friends who recommend cryptomarkets. Second, preliminary analyses suggested women were more inclined to purchase through proxies, a finding which was beyond the scope of our analysis. Trust is based on experience and buying through a proxy is likely to moderate the effect of experience. Gender differences may therefore indicate a combination of network/reputation effects wherein women have less access to direct information about cryptomarket experiences.

The higher quality of substances has been posited as one of the reasons for the



growth of cryptomarkets, but quantitative studies of chemical composition have not produced conclusive evidence (Caudevilla et al., 2016; Rhumorbarbe et al., 2016). The most robust evidence is a survey by Werse and Kamphausen (2019), which finds that buyers choose cryptomarkets for their quality. However, the questions posed do not incorporate a comparative dimension and are restricted to Germany and Austria. Whereas concerns of representativeness limit the conclusions of researchers, buyers are willing to generalize based on relatively little information. Our finding supports the sentiment that cryptomarkets are a preferable alternative to other drug markets with regards to product quality. These findings provide evidence for the harm reduction discussion that revolves around cryptomarket harms relative to offline drug markets (Aldridge et al., 2018a; Martin, 2018b). Higher quality substances that are less likely to be diluted (i.e. "cut" with other drugs) or of higher potency have concrete implications. Whether these reduce or increase harms, however, is debatable. They may increase overdose risks (Martin, 2018b), but may also reduce them (Lefrancois et al., 2020). In either case, consumption and harm reduction practices are crucial, and cryptomarkets have been argued to promote safer drug use (Bancroft, 2017). Higher quality substances may also promote higher consumption (Barratt, Lenton, et al., 2016). This study cannot answer whether cryptomarkets increase harms, but we provide evidence suggesting that buyers believe they access higher quality substances. These findings can inform both the harm reduction discussion, as well as enforcement aspects of drug policy (Martin, 2018a).

Concerning enforcement of drug policy, research has documented the rapid reorganization of the trade following crackdowns (Décary-Hétu & Giommoni, 2017; Ladegaard, 2018b). This response is supported by reputation transferability between markets (Norbutas et al., 2020b), and the social ties that evolve out of repeated exchanges (Décary-Hétu & Quessy-Doré, 2017). Both are mechanisms that are robust to external disruption, but institutional trust can remain stable as well. This stability and robustness of the ecosystem as a whole challenges enforcement policies which may only be able to curtail activity in the short term (Décary-Hétu

& Giommoni, 2017). Scholars have suggested that targeting reputation systems can increase cooperative and product uncertainty, and deter trade (Duxbury & Haynie, 2020). The efficacy of such interventions, however, may be contingent on buyers operating under the belief that some vendors are more trustworthy than others. Consequently, with regards to continued enforcement and strategy we highlight that institutional trust may not be disrupted as easily as individual platforms or sellers.

Concerning the study of trust in illicit online markets more generally, our findings suggest that trust is not restricted to the dyad, the seller-buyer relationship that emerges through repeated exchanges (Décary-Hétu & Quessy-Doré, 2017; Duxbury & Haynie, 2018a), the reputation system (Hardy & Norgaard, 2016; Przepiorka et al., 2017), or the governance of markets (Odabaş et al., 2017a). Although we specifically study cryptomarkets, we suggest that the process of producing institutional trust through interaction need not be restrained to online markets, nor drug markets. The production of trust through iterated interactions is a key theme in the sociological literature on trust (Granovetter, 1985; Sztompka, 1999; Zucker, 1986). Consequently, we suggest that similar to legal institutions, market participants may also develop trust in illicit market institutions. Whether such trust emerges, however, is likely contingent on institutional performance.

The challenge for future research is to connect beliefs with action. Because trust is a cognitive Bayesian process (Hardin, 1993; Lewis & Weigert, 1985), these are components that are difficult to observe using the traditional repertoire of webcrawling methods which measures cooperative behavior (Munksgaard et al., 2016; Soska & Christin, 2015). For example, the existence of offline reputation effects, which we suggest, necessitates the use of survey data to study peer influences in cryptomarket adoption. The cross-sectional design of the GDS makes establishing causal relations difficult and propensity score matching does not fully resolve the problem. Future research may move beyond this limitation by using longitudinal designs that measure both behavior and beliefs. We suggest this mutually constitutive relation between trust and experience, for example the offline reputation

effects, as fruitful avenues of future research.

## 9.9 Conclusion

Within this paper we have examined the association between the expression of general positive expectations and cryptomarket usage. We hypothesized that cryptomarket buyers would express general and positive sentiments when compared with non-buyers. Using data from the 2018 Global Drug Survey we applied propensity score matching to build a control group balanced across covariates after which we applied multilevel linear regression. After matching we find consistent and large differences in beliefs between cryptomarket buyers and non-buyers, and variation between countries. These findings suggest that actors in illicit online markets are capable of building general attitudes of trust, despite uncertain circumstances, based on relatively little evidence. By extension, these findings also provide evidence that cryptomarkets perform better than offline alternatives as the group of cryptomarket buyers, relative to a control group, generally agrees with statements concerning better, or more correct, value, purity, price and weight.

We contribute to the discussion of harm reduction and online drug markets by providing evidence that relative to a control group, buyers express general and positive beliefs in the performance of cryptomarkets to supply better products in terms of weight, value, purity and price.

## CHAPTER 10

### CONCLUSION

Over the following pages, I will summarize this work and attempt to broaden its scope. I begin by discussing the theoretical and conceptual development of the work and situating it within the criminology of illicit markets. Here, I seek to highlight how the economic sociological approach influenced this work and analysis to demonstrate its applicability. This, however, necessitates leaving behind the functionalism of the transaction cost framework and to be cautious in applying the notion of coordination problems. The discussion will revolve around my thesis that cryptomarkets modernize the otherwise premodern exchange modalities of illicit markets (Beckert & Wehinger, 2013). The implications of the modernization thesis are those which early social theory itself struggled with (Misztal, 1996), how to reconcile the erosion of the social bases of trust with the existence of complex social structures (Luhmann, 1979). I therefore proceed to discuss trust and the empirical work in the light of this thesis.

As I turn towards the discussion of trust, I begin by reiterating what I argue is a fundamental schism in the scholarship on illicit online markets: The question of social order. My contention is that the literature has failed to recognize and reorganize its assumptions about the social order of illicit online markets, and that this constitutes a significant limitation. In the following section, I subject the schism to scrutiny through a discussion of the paper *Uncertainty and Risk: How actors set prices in online drug markets*. I argue that the notion of active trust production is more enlightening, because it draws attention to the productive potential of administration. Following this discussion, I turn my attention towards the two articles, *Building a Case for Trust: Exchange relations and risk-taking in illicit online markets*, and *A change of expectations? Generalizing trust in illicit online drug markets*. These two emphasize experience as the central causal process in the production of trust, my proposal for bridging the schism. Before discussing

them, however, I discuss the seeming incongruence of my argument, that trust is embedded while the market is atomized. I end the discussion of the findings by critically evaluating the evidence of the three articles. Hereafter I draw attention to limitations to this work, and propose areas of future research. I then conclude the work by summarizing it and responding to the question of how trust is produced in illicit online markets, after which I reflect on the utility of the economic sociological approach and whether it should be economic criminological.

### **10.1 New markets, new problems**

I began this work by situating it within a growing movement that posits an economic sociological approach to illicit markets can reconcile the divide between economically and culturally inclined narratives, by acknowledging the social embeddedness of exchange (Moeller, 2018a; Moeller & Sandberg, 2019), and conceptualizing illicit markets as illegalized social arenas of exchange (Beckert & Dewey, 2017b; Beckert & Wehinger, 2013). While this is a relatively recent development in the study of illicit markets, economic sociological concepts are by no means alien to criminology, and they are especially utilized by scholars who apply social network analysis. Young and Haynie (2020), for example, use extensions of network embeddedness developed by Buskens and Raub (2002) to study trust in prisons outside an economic context. Similarly, Granovetter's (1973) early work on the strength of weak ties has been utilized by Malm et al. (2017) and Bouchard and Ouellet (2011) in studies of illicit economic networks. Outside network analysis, Sergi and Storti (2020) uses an economic sociological framework to study the port-crime nexus.

Nevertheless, illicit markets have historically been ceded to economists, namely, the risks & prices framework (Bushway & Reuter, 2008; Reuter & Kleiman, 1986). Reuter's original and subsequent work, which used an industrial economics framework and transaction cost economics (Reuter, 1984), constitutes the dominant paradigm in the study of drug market economies. The work can be seen as already engaging with some of the rigid assumptions of an economic approach, namely,

the division into markets and hierarchies (Williamson, 1973, 1981). Reuter (1984) himself suggested that these assumptions were one of the reasons why the Mafia was given the role of a powerful hierarchical organizer of illicit markets, despite accumulating evidence of its role as a dispute resolver (p. 151, 185).

This tension between theoretically grounded expectations and empirical findings, specifically, the heterogeneity of illicit markets contrasted to the functionalism of the market/hierarchy distinction, is observed by Moeller (2018a). Moeller suggests combining the transaction cost framework with the economic sociological notion of social embeddedness. However, this introduces another problem, because economic sociology itself developed in reaction to transaction cost economics, namely, its functionalism and its resolution to the Hobbesian question (Granovetter, 1985, 1992). I suggested returning to some basic economic sociological propositions in Chapter 2, further reducing the emphasis on transaction cost economics to the problems of bounded rationality and opportunism. Instead, I stressed the social embeddedness of economic action, and the notion of institutions as social constructions, two themes, which the remainder of the work has revolved around and deployed.

In Chapters 2 and 3, I reviewed the literature on illicit markets, online and offline. Seeking to differentiate cryptomarkets as a subgenre of illicit online markets in Chapter 3, I suggested Moeller's (2018a) "marketness" and centralized governance as two continua along which illicit online markets could be situated. In the introduction of centralized governance, I especially drew on work by Odabaş et al. (2017a), which is in extension of a larger literature on illicit online markets for stolen data (e.g. Dupont et al., 2017, 2016; Holt, Smirnova, & Chua, 2016; Wehinger, 2011). In developing this typology, I argued that illicit online markets may be differentiated across these axes, from low social complexity towards the more complex forms in which escrow systems, product verification, and a more complex division of social control labor exists (J. Griffiths, 1984). It is at the extreme end of the spectrum where cryptomarkets are found, high in governance and high in marketness.

Drawing on the economic sociological notion of institutions as social constructions, (Fligstein, 2001; Granovetter, 1992), and recent advances, I applied the concept of "framing", suggesting that like the Sologne strawberry market, the cryptomarket is code that frames economic exchange in a particular way (Callon, 1998b). I argued that it was in this economic ideal, derived from libertarian anarchist politics, that the root of the particular economic structure should be found. Furthermore, the stability of the institutional form, which at the structural level has failed to adopt measures like product verification and multisignature escrow, is best understood through the tendency of social institutions to lock-in and become almost immovable structures (DiMaggio & Powell, 1983; Fligstein, 2001). I argue that this is a more convincing explanation of this unique institutional form than what can be provided by the functionalist reasoning of the transaction cost approach (Williamson, 1981). It also proposes an explanation for the unique institutional form which is not found in studies that have applied the notion of coordination problems to cryptomarkets (Bakken et al., 2018; Tzanetakis, 2018b). If the argument is accepted, however, then the question of trust must be approached in a different manner. In Chapter 4 I introduced the concept of trust, defined the problems of trust and trust itself, and discussed its production and measurement. This provided the framework for Chapter 5, in which I sought to bring these pieces together. Here, I pursued the proposition that cryptomarkets institute an unprecedented degree of modernization of exchange, and reframed the problem of trust within these terms.

Beckert and Wehinger (2013) argue that actors in illicit markets, as a consequence of illegalization, must rely on premodern trust devices instead of contracts, courts, regulations, and institutions. This argument is compatible with social control theory (Black, 1976, 1990), and its application (Jacques & Wright, 2008, 2011; Moeller et al., 2017), in which illicit markets are seen as governed by informal social control due to the absence of the state (Adler, 1993; Reuter, 1984). Illicit online markets, however, take a peculiar form. Scholars generally agree that informal social control is at work through reputation systems and informal reputation

(Morselli et al., 2017; Przepiorka et al., 2017). But there is a formalization of the market institution which cannot be ignored (Bakken et al., 2018): Contracts are implemented through escrow systems, sanction is formalized in the reputation systems, courts are erected in the dispute resolution system, and the administration stands ready (Odabaş et al., 2017a, 2017b). From this point of view, Beckert's proposition should be moderated, since the cryptomarket administration operates functionally as a primitive state (Martin, 2014b). It extracts rent from its subjects through commissions, and illustratively, it takes a decentralized cryptocurrency, bitcoin, and requires waiving of property rights to engage in trade through the escrow system (Moeller et al., 2017). The state is a crucial actor in the creation of stable worlds of exchange and by securing and ordering property rights, the cryptomarket takes one of its basic functions (Beckert, 2009; Fligstein, 2001). It may be argued that multisignature escrow can resolve this problem, instituting a sort of decentralized property rights (Lorenzo-Dus & Di Cristofaro, 2018), but it remains that centralized escrow and advance payment are the predominant modes of payment (Martin et al., 2019, chapter 1). In fact, the ecosystem has stabilized to such a degree that large-scale predation, marketplace exit scams, and seizures by law enforcement are now the cost of doing business (Martin et al., 2020), and a relatively frequent occurrence (Ladegaard, 2020). For example, on Empire Market we found almost no products sold through multisignature escrow.

The economic sociological approach, in combination with the sociology of trust and social control theory, therefore revealed a unique development in which illicit online markets began to bear a semblance to the transition to capitalism, rather than exhibiting organizational changes (e.g. Ladegaard, 2020; May & Hough, 2004). Moderating Beckert's proposition, that illicit markets rely on premodern trust devices, reputation, violence, threats, and informal social control, I proposed that the cryptomarket had to be seen as modernizing the production of trust. Under conditions where the traditional bases of trust erodes (Zucker, 1986), and economic action is sought separated from its social context (Callon, 1998b; Polanyi, 2001), the question appeared to be the one that faced sociologists at the dawn of modernity



(Misztal, 1996), and which haunts social theory still (Stolle, 1998); the problem of trust under immense complexity and social atomization (Luhmann, 1979). Thus, the thesis I developed in these chapters necessitated revisiting the fundamental assumption of illicit markets as premodern modes of exchange.

### 10.1.1 Trust and order

Trust is a fruitful concept analytically, because it lays bare the assumptions of social theory (Misztal, 1996). It forces one to recognize, and reconcile, the relation between agency and structure, and consequently it becomes necessary to discuss order and disorder. Reviewing the literature of trust in illicit online markets, it became apparent that the problem Granovetter (1985) sought to resolve was still haunting this domain. At one end, sociologists and economists presented cryptomarkets as examples of order to emerge spontaneously, outside the confines of the law (Eschenbaum & Liebert, 2019; Hardy & Norgaard, 2016; Przepiorka et al., 2017). That is, driven by little more than self-interest, order would emerge because the reputation system institution incentivized honesty (Milgrom et al., 1990). The centrality of the reputation system, and the assumptions of its proponents, is perhaps best summarized in an agent-based model designed by Norgard et al. (2018) in which an offline and online drug market are modeled. In both, actors prefer to exchange with reputable peers, but in the latter no geographical restrictions exist. The issue is neither the model nor the rigorous work, but the assumptions that are reflected in it: Online, exchange is liberated from its only remaining social restriction, distance. Though this school has brought valuable insights and solid empirical proof as to the efficacy and potential of reputation systems, the undergirding assumptions are in stark contrast to those of criminologists.

An extensive body of work on illicit online markets by criminologists has taken a more practical angle, emphasizing power and control. Perhaps this comes naturally for a discipline which historically has struggled with the Hobbesian problem in its own way (Garland, 2001), for which social control theory remains relevant (Moeller et al., 2017; Morselli et al., 2017), and for which the specter of organized

crime looms in the background (Lusthaus, 2012, 2013). Could anything other than a sensitivity towards control and power be expected? Theoretically, the inclusivity of the criminological position is captured by Odabaş et al. (2017a), who highlight the nuances of governance in illicit online markets, suggesting that they exist on a continuum, a sentiment that is rooted in arguments from a larger body of scholarship that has addressed the centrality of administration to the existence of stable worlds of exchange online (Dupont et al., 2016; Lusthaus, 2012, 2013). Empirically, the inclusivity manifests in the inclusion of escrow and status, not only reputation, as regression models are estimated (Décary-Héту & Quessy-Doré, 2017; Odabaş et al., 2017b). The position is not over-theorized, but the centrality of administration in establishing stable worlds of exchange is remarkably similar to the role economic sociologists give the state (Beckert, 2009; Fligstein, 2001; Granovetter, 2017).

This schism, while seemingly abstract on the surface, is in fact quite simple: On the one side, stand scholars who argue that there is no law in illicit online markets, that they are decentralized, and that exchange is socially disembedded (Eschenbaum & Liebert, 2019; Hardy & Norgaard, 2016; Przepiorka et al., 2017). On the other side, scholars operate under the recognition that the reputation system is coded by an administrator, who, by changing a few database entries, could reorganize this entire social order, and that administrators are crucial to the establishment of stable worlds of exchange (Décary-Héту & Dupont, 2013; Lusthaus, 2012). My contention is, decidedly, that criminologists are correct, and my analysis supports this thesis. Administrators build markets, they instate property rights, and they exercise an unprecedented level of social control. If anything, there is quantitatively more law in cryptomarkets than in most illicit markets, and it is necessary to look at insurgent groups to find any similar examples at this scale (Gutiérrez D. & Thomson, 2020; Martin, 2014b).

Yet, I do not believe it is fruitful to surrender and give Hobbes' answer, that order is instituted by the sovereign, and from thereon all is good and well (Granovetter, 1985). Neither does the criminological position invite this response. Illicit markets are heterogeneous, and one of the principal insights from criminologists has

been that they are sometimes quite peaceful and orderly (Adler, 1993; Moeller & Sandberg, 2015; Reuter, 1984), although not always so (Jacques et al., 2014; Naylor, 2003). If anything, this body of evidence suggests that Granovetter’s (1985, p. 493) contention, that it is the social structure itself that determines whether order or disorder is found, should be pursued. Thus, the first aim of this work was to examine the productive function of administrative governance in the empirical setting preferred by the reputation position – prices.

### 10.1.2 Making order: The productive function of administration

The literature on illicit online markets posits that a range of mechanisms produce trust, reputation, status, social stability, institutional similarity, repeat exchanges, and escrow, yet it has no overarching framework. My review of the literature in Section 5.1 suggested that some of these were comparatively under-scrutinized, and that frequently, only one or two were examined in the same study. Thus, I proposed the notion of active trust production, various institutional features that are intended to reduce cooperative and product uncertainty, and lower the bar to cooperation. This was the guiding motivation of the first paper, *Uncertainty and Risk: How Actors Set Prices in Online Drug Markets*, in which we made several contributions to the literature.

First, we extended the approach to analyzing prices in online drug markets methodologically. We derived a coding scheme respectful to the heterogeneity of drugs, namely, the fact that risk, culture, and purity are likely to influence price. Second, we used an extensive dataset of 92,246 observations, which allowed us to model within-product variation using a 4-level multilevel regression. As discussed in Section 6.3.1, this is a comparatively complex design. Our most significant innovation, however, was the extension of the baseline reputation-valuation model. While our paper does not directly address the assumptions that undergird it, our analysis provides evidence of the productive function of power that constitutes an important empirical and theoretical contribution.

We found that in 4 of the 6 scenarios, products sold outside contracts are

significantly cheaper. Furthermore, only in 5 of the 10 scenarios did the anticipated reputation effects manifest. Notably, in 2 cases the effects were inverse of what was expected. We also observed some differentiation among sellers that suggested a trend towards setting prices in accord with the mean as reputation accumulated. Finally, in 2 out of 6 scenarios did we find the expected sign and direction of status. Thus, our findings do not suggest that order in illicit online markets emerges spontaneously out of self-interest, at least with respect to price (Eschenbaum & Liebert, 2019; Hardy & Norgaard, 2016; Przepiorka et al., 2017). Rather, the authenticating and mediating functions of administration, status and contracts, seem to comparatively influence prices to at least a similar extent. This provides evidence for the established criminological position towards the production of trust and order in illicit online markets, that centralized governance is a crucial actor in producing trust (Lusthaus, 2012; Odabaş et al., 2017a).

Furthermore, the constitutive role of the state in creating markets is demonstrated in our findings overtly and through a curiosity. First, our results concerning quantity discounts and country-level variation provide support for the risks & prices thesis, that the state is the primary driver in drug prices. It may not be effective in curtailing prices and demand, but the correlation between price and quantity discounts follows the pattern predicted by the risks & prices framework for both heroin and cocaine, and the magnitude of between-country variation cannot be understated for these two either (Boivin, 2014; Reuter & Caulkins, 1998; Reuter & Kleiman, 1986). Second, the productive function of the state in creating a market order is perhaps best illustrated in the stark premiums on cannabis diverted from the legal market. Here, the value creation "parasitically" feeds off the licit market that is supported by the state (Beckert & Wehinger, 2013). Though the sample size restricts grand conclusions, a price increase of almost 50% between two grams of cannabis, for which the difference is private industry branding and state regulation, suggests that the productive function of legality and the state cannot be underestimated.

Thus, from the perspective of social significance, the evidence falls decidedly

and unsurprisingly on the side of the paradigmatic framework, risks & prices. We further observe a curious artefact, suggesting the state is indirectly influencing valuation through regulation. However, within this formal institutional context, sellers are provided with a set of active trust producing mechanisms. These provide "wiggle room" in price-setting, but they are not the primary determinants. My contention is therefore not that past studies of reputation systems are incorrect, but that in ignoring country-level variance and administrative governance, illicit online markets effectively become socially atomized markets where actors are unrestrained by coercive and productive power. The constitutive function of power, state and non-state, in the creation of markets is effectively controlled for indirectly by excluding them from the analysis (Granovetter, 2017, p. 59). The notion of active trust production is utile, because it is not restricted to a single mechanism. Neither does it need to be restrained to the administration, in fact, the premium on legal cannabis may be seen as a result of active trust production outside the cryptomarket.

### 10.1.3 Atomization and embeddedness

Granovetter's (1985) trick to resolve the deadlock between under- and over-socialized concepts of economic action, is to situate it as socially embedded. Overwhelmingly, this has meant that networks have been prioritized in empirical and theoretical work (Krippner, 2001), something that Granovetter (2017) himself has acknowledged. Deprioritizing networks empirically, as I have done, does not purge social relations of content, however. Rather, I put emphasis on the production of trust as a subjective estimate of the trustworthiness of others produced through the accumulation of experience. First, though, an unaddressed shortcoming in my thesis must be addressed: I argued that cryptomarkets modernize exchange relations, and erect functional replacements to the social bases of trust in these conditions. Yet, still I claim that trust is produced through social integration and the accumulation of experience?

This critique resonates with a 35 year-old misunderstanding concerning the con-

cept of embeddedness. The concept originates with Polanyi (2001) who suggested that whereas premodern economies were embedded in social relations, modernization embedded social relations in the market (Beckert, 2007). In his adaptation of embeddedness, Granovetter (1985) proposed that economic exchange was always socially situated in concrete networks and overlaid with social content (see also Swedberg & Granovetter, 1992). Thus, there are in fact two radically different notions of embeddedness, a problem that still resonates in economic sociology (Beckert, 2007; Krippner, 2001; Krippner & Alvarez, 2007). And it is present in my thesis as well: How can exchange framed as an ideal market, relatively purged of social content, in which socially atomized anonymous actors exchange goods, be reconciled with my contention that the primary mechanism of producing trust is social interaction and the accumulation of experience?

Callon (1998a) probes this problem using the economic concept of externality. Externalities are, in the simplest example, a factory that discovers it has been polluting the residents of a neighboring town (p. 245). This is an "overflowing" of the "framing process", and this provides the basis for reframing the notion of embeddedness. The frame, the social construction of economic action, confines and restricts economic action (Callon, 1998b; Fligstein, 2001; Granovetter, 1992). In the cryptomarket, this is as a socially atomized anonymous bazaar (Pace, 2017). Yet, the interaction cannot be confined to the atomizing frame (Callon, 1998a, p. 248). The notion is insinuated towards by Granovetter (1985) himself, in a much more concrete manner, when he argues that ongoing economic relationships creates social ties (p. 496). Perhaps, the parties meet to discuss the details of a contract over drinks, or perhaps the the trustor comments on the photo of the trustee's children positioned on a desk. In either case, a social relation starts to emerge, because the framing of economic exchange cannot persist. Here, Callon (1998a) uses the example of a research contract between academics and a firm, which "does not bind one human being to another, but one legal entity to another" (p. 253). As the scientific process demands, research collaborations, novel ideas, conferences, and so forth inevitably result in an "overflow" beyond the contract

in which the contracted research project becomes embedded in a larger network, and it is "this dual nature that guarantees the productivity of the entire complex" (p. 254). Perhaps, an unanticipated scientific breakthrough, far beyond what the contract anticipated, overflows in the weeks before the contract ends.

Because trust is a Bayesian cognitive process, generalizations are produced through experience at both the individual and abstract level (Buskens & Raub, 2002; Misztal, 1996; Sztompka, 1999). Whether justified as the coming together of worlds and social integration (Zucker, 1986), or as a rational process of information accumulation (Hardin, 1993), my contention is that the propensity to trust produces an overflow thereof. The overflow is already observed in an intently atomized market, where we observe buyers return to sellers and develop loyalty, despite the supposed order instituted by either centralized governance or reputation systems. Put simply, could anything less than trust be expected, when a buyer takes a leap of faith, receives, consumes, and experiences a psychoactive substance?

#### **10.1.4 Experience as the central causal process**

In Chapter 5 I highlighted that the literature on illicit markets more generally operated with a relatively restricted notion of trust that emphasized cooperation as the empirical manifestation of thereof (Gambetta, 1988a; von Lampe & Johansen, 2004). In the study of illicit online markets, this tendency appears as studies that prioritize cooperation or reputation as a proxy of trust. Cooperation is a well-established measure of trust (Lewis & Weigert, 1985), as discussed in Section 4.4, but its validity hinges on it being based on a subjective estimate of trustworthiness. In Section 5.3 I argued that whether one approaches trust from the micro or macro perspective, in both cases trust hinges on the development of positive expectations through a cognitive Bayesian process. The rational approach to trust may stress information, experience, or learning (Buskens & Raub, 2002; Coleman, 1994; Hardin, 1993), whereas sociologically inclined scholars stress the coming together of worlds and social integration (Möllering, 2005b; Sztompka, 1999; Zucker, 1986). Both, however, agree that trust is primarily built through experience and

encounter.

A recent innovation in the study of cryptomarkets has been the discovery and excavation of datasets that allow the measurement of exchange relations (Décary-Hétu & Quessy-Doré, 2017; Duxbury & Haynie, 2018a, 2018b, 2020; Norbutas, 2018; Norbutas et al., 2020a). Overwhelmingly, the approach has utilized social network analysis, and findings from, in particular, Décary-Hétu and Quessy-Doré (2017) and Norbutas et al. (2020a) suggest that experience and encounters are relevant events. Décary-Hétu and Quessy-Doré (2017) find that buyers exhibit loyalty, which is corroborated by Norbutas et al. (2020a) who find that buyers prefer to return to sellers. In both cases, it is the acquisition of information that is hypothesized as the driving element of this loyalty. In *Building a Case for Trust: Exchange relations and risk-taking in illicit online markets* I pursued this thread, drawing on the cooperative or behavioral tendency within the sociology of trust (Lewis & Weigert, 1985). I hypothesized that accumulating experience with a seller provided the most robust confirmation of trustworthiness, because it is undiluted by the transitivity of trust (Glückler & Armbrüster, 2003), and that past exchange history would be associated with a propensity to engage in more risky future ventures. Thus, whereas Norbutas et al. (2020a) and Décary-Hétu and Quessy-Doré (2017) show preference and loyalty through choice, this study probed risk-taking in cooperative endeavors. Following the discussion of active trust production, the study further included measures relating to these. The study found that past exchange history was consistently associated with transaction size, as hypothesized, but that counterintuitively, exchanges outside escrow tended to be much larger in value. The study further probed whether associations between active trust production and transaction value were moderated by experience, but found no conclusive evidence thereof.

Though counter-intuitive, the findings concerning escrow conform to elements in the sociology of trust and cooperation. The cooperative tendency has argued that contracts are functional alternatives to trust, and found that when contracts were removed from trust games, players would invest less (Kollock, 1994; Kuwabara,



2015; Simpson & McGrimmon, 2008). Within the macrosociological tendency, contracts and institutional support for trust are seen as conducive to trust, as institutionalized understandings, routine, and shared norms come to replace reading the fine print (Sztompka, 1999; Zucker, 1986). Both therefore support the notion that contracts are not necessary components of exchange, especially when actors behave in a trustworthy manner. Consequently, this moderates the function of active trust production, because apparently, buyers are prone to putting even more on the line outside contracts. This is a novel finding, because the general assumption has been that escrow resolves the problem of cooperation or opportunism (Moeller et al., 2017; Odabaş et al., 2017a; Tzanetakis et al., 2016).

A pattern emerged in both *Uncertainty and Risk* and *Building a Case for Trust* wherein coefficients would vary in magnitude, direction, and sign, with regards to reputation and status, between the two markets studied. This encourages cautious interpretation of these effects, but it is notable that past exchanges with a seller remains consistent in both contexts. This strengthens the evidence for my thesis that the exchange builds interpersonal trust, which is further supported by findings concerning loyalty from Décary-Hétu and Quessy-Doré (2017) and Norbutas et al. (2020a). This propensity to engage in more risky ventures is illustrative of the productive function of trust to extend the repertoire of actions.

In *A change of expectations? Generalizing trust in illicit online drug markets* I built on the experiential position within the macro perspective on trust, which has generalized the notion of the cognitive dimension of trust as a Bayesian estimate (Carlsson et al., 2018; Dawson, 2019; Sønderskov & Dinesen, 2016). Thus, whereas behavior may be seen as a product of cognition, this paper reverses the relation, proposing that behavior informs cognition through experience. However, whereas the position taken in the previous paper, and those concerning repeated exchanges rested on the notion of interpersonal trust, I suggested that experience could just as well produce general positive sentiments.

This hypothesis builds not only on the literature on trust, but also two prevailing tendencies in the literature on cryptomarkets. Respondents in qualitative research

have been observed to make general statements about cryptomarkets providing better or more pure drugs (Barratt, Lenton, et al., 2016; Van Hout & Bingham, 2013), and there is a prevailing sentiment in the scholarship that this is the case (Aldridge et al., 2018b; Martin, 2018b; Martin et al., 2019). However, the few studies that have chemically examined drugs purchased from cryptomarkets only provide partial evidence to support this claim (Caudevilla et al., 2016; Rhumorbarbe et al., 2016), which is then further complicated by the problematic relation between price, purity, and perceived quality (Bancroft & Reid, 2016; Ben Lakhdar, 2009). Thus, a curious case exists in which both scholars and buyers argue that cryptomarkets are superior, yet the evidence is acknowledged to be shaky.

Rhumorbarbe et al. (2016) purchased four products on a cryptomarket and concluded that "generalising these results to other shipping and destination countries is, so far, impossible" (p. 179). Using propensity score matching, we found that cryptomarket buyers were able to reach much more confident conclusions concerning the superior performance of cryptomarkets across value, purity, price, and weight after, on average, a few more purchases, than the research team. Inevitably, the question is then how people are able to generalize on such little data, but that is specifically the function of trust (Luhmann, 1979). To reduce the overwhelming complexity, what researchers call representativeness, and simply use the best available information to produce an estimate (Hardin, 1993). The more problematic issue is then whether this estimate is actually reflected in behavior, a key discussion in the micro/macro and behavior/cognition divides in the study of trust, as discussed in Section 4.4. Sometimes the relation is inverse, that trusting individuals act in prosocial manners (Glaeser et al., 2000), whereas other times the correlation between behavior and cognition is contingent on the specificity of the target of trust (Carlsson et al., 2018; McEvily et al., 2012). Fundamentally, however, one ends up in the cognition versus cooperation debate, and either side presents a compelling argument. One may argue that cooperation can be forced, necessary, or just convenient (Rousseau et al., 1998), whereas another may argue that general beliefs are estimates and not indicative of trust (Glaeser et al., 2000). Rather than resolve this

puzzle, I have shown that experience produces both a propensity towards taking increasing risks and towards developing abstract general estimates.

Thus, the two papers that center around the notion of experience are illustrative of Callon's (1998a) notion of framing and overflow. The conditions are set through active trust production, which should have resolved the problem of trust. Yet, as experience accumulates, an externality arises; trust. Abstract and interpersonal generalizations arise from the propensity to trust, and as evidence accumulates, bolder beliefs are held and riskier courses of action pursued. Circumstantial evidence transforms into certainty.

### 10.1.5 Evaluating the evidence

The decision to incorporate replication into the design may be scientifically appropriate, emphasizing replicability, transparency, and generalization, however it does not inspire grand conclusions (Bernardi et al., 2016; Carver, 1993). As discussed, the components conceptualized as active trust production are inconsistent with regards to sign, direction, and magnitude in both *Uncertainty and Risk* and *Building a Case for Trust*. Summarizing the findings, advance payment is associated with more risky transactions, contrary to expectation, in two markets. This is counter to expectation which suggests that escrow is conducive to trust (Martin, 2014a; Moeller et al., 2017; Tzanetakis et al., 2016), though may be reinterpreted as congruent with laboratory experiments of contracts (Kollock, 1994; Simpson & Eriksson, 2009). Regardless, it does not support the model I have proposed. In *Uncertainty and Risk* there is more support for the model with significant discounts on advance payment products in 5/6 cases, with the last case being insignificant and positive. Estimates, however, do not suggest large effects. Concerning reputation, estimates follow the expected directions in 2/4 cases in *Building a Case for Trust*, but are inverted in the remaining, though only significant in one case. For status, results follow the expected direction 4/5 cases in *Building a Case for Trust*. In *Uncertainty and Risk* 8/12 estimates take the expected direction, significant in 5 cases. Status effect follow the expected direction in 4/6 cases in *Uncertainty and*

*Risk*, significant in 2 cases. In the case of experience, results are consistent in both *Building a Case for Trust* and *A Change of Expectations?* However, the potential for replication is limited and as the variable is only operational three times.

In summation, these findings only provide limited evidence for the model concerning the active production of trust, and in some cases they provide results contrary to expectation. It is possible to reinterpret findings, as with escrow, or suggest that institutional contexts moderate effects. But this requires reasoning backwards. Results for experience are consistent, though limited by the number of replications. It is possible, though unethical, to evaluate the evidence selectively, choosing only the almost consistent status estimates, and fully consistent reputation estimates, for Silk Road in *Building a Case for Trust*. The same may be done for Empire in *Uncertainty and Risk*, while suggesting that reputation effects are subsumed under status levels. It may then be argued that as these markets are the largest they are highest in marketness which should yield greater effects (discussed below). However, this is not the theoretical model, and neither is size argued to affect these variables in the literature (e.g. Bakken et al., 2018; Moeller et al., 2017; Odabaş et al., 2017b; Przepiorka et al., 2017).

Rather than retreating into speculation, further reflection, additional theoretical development, and further empirical examination, should be undertaken in the light of these findings. Replicability, however, should spur caution for future research in illicit online markets. As J. L. Davis and Love (2019) argue, studies of online platforms may be considered tests of theory drawing on laboratory experiments. However, the consistent and strong knowledge claims based on laboratory research requires replication (see N. D. Johnson & Mislin, 2011, for an example). Online data, and illicit online markets especially, provide the means to do so within single studies. Models can be estimated for separate drugs, and platforms can be analyzed separately.

## 10.2 Limitations

There are limitations to the empirical, and conceptual, work I have undertaken. The model of trust production I have proposed is simple, and can well be extended; data is limited; the methodological approach is not conducive to grand claims; and I have focused on within-market analyses. These limitations encourage caution, but can also inspire future research.

Experience, rendered operational as exchange, is the central element of the conceptual model I have suggested. The model implies that on the absence of experience, buyers will rely on active trust production (Zucker, 1986). Within the conceptual model, first-time buyers are therefore included. However, the expectations about the future, the Bayesian estimate of trustworthiness, is in the absence of experience argued to rest on institutional sources of trust (Luhmann, 1979; Zucker, 1986). Experience produces both interpersonal and abstract trust, which *Building a Case for Trust* and *A Change of Expectations?* provide evidence for. These findings are congruent with studies that have documented that buyers initially choose sellers based on reputation, after which they rely on past experience (Décary-Héту & Quessy-Doré, 2017; Duxbury & Haynie, 2018a, 2018b; Norbutas, 2018; Norbutas et al., 2020a). As such, the model accounts for first-time buyers, is in accord with past research and extends it, but implies a more complex dynamic for returning buyers.

The data analyzed in *Building a Case for Trust* suggests, and so does all of past studies of exchange patterns (Décary-Héту & Quessy-Doré, 2017; Duxbury & Haynie, 2018a, 2018b; Norbutas, 2018; Norbutas et al., 2020a), that most exchanges are between sellers and first-time buyers. However, while not central to the analysis in *A Change of Expectations?*, I found that both the mean and median number of purchases reported by buyers in the Global Drug Survey were much higher (11 and 5). The GDS is a non-probability sample, and while argued to be representative it cannot, without further evidence, be generalized onto the population of cryptomarket buyers (Barratt et al., 2017; Enghoff & Aldridge, 2019). Cryptomarket

data, however, is just as limited whether collected through webcrawling or seizure (Kruithof et al., 2016; Stinenbosch, 2019). In both cases buyers can have a career of using multiple cryptomarkets. If the case is so, that buyers purchase drugs over a period of years through different cryptomarkets, then neither seizure data nor data from one or more cryptomarkets can establish a complete historical record. This problem is just as challenging as that which is suggested in past research, that buyers may use multiple accounts (Décary-Héту & Quessy-Doré, 2017). The hypotheses of *Building a Case for Trust*, and those of past research, do not hinge on measuring all transactions. That is, to test whether buyers return to vendors (Décary-Héту & Quessy-Doré, 2017; Norbutas et al., 2020a), choose reputable sellers (Duxbury & Haynie, 2018a), or tend to exchange more with them, do not necessitate a full transactional record for hypothesis testing (J. L. Davis & Love, 2019). However, it does attach uncertainty to parameter estimates if, for example, a buyer has an unrecorded history with a seller. Without detailed longitudinal surveys, or alternative methods, it is uncertain to what extent measurements of exchange networks in illicit online markets actually reflect buyers' and sellers' histories.

In both *Risk and Uncertainty* and *Building a Case for Trust* I find limited evidence for reputation effects, which seem well-established in the literature (Duxbury & Haynie, 2018a, 2018b; Norbutas et al., 2020a; Przepiorka et al., 2017). First, it must be stressed that they are not with regards to price. Espinosa (2019) do not find consistent reputation effects, and neither does Červený and van Ours (2019) or Hardy and Norgaard (2016). I do not contend that reputation systems are irrelevant, they are both a central part of the conceptual model and well-documented for other behavior than valuation (Duxbury & Haynie, 2018a; Norbutas et al., 2020a; Przepiorka et al., 2017), but their efficacy in licit online markets is not immediately transferable to illicit ones (e.g. Diekmann et al., 2014; Resnick et al., 2000). As we document in *Risk and Uncertainty*, it is fully possible to replicate reputation effects using the design of Przepiorka et al. (2017), but this necessitates assuming that coefficients are similar for all three drugs. Furthermore, reducing repeated measurements also leads to varying coefficients which while positive may not remain

significant. Both choices require violating fundamental assumptions about illicit markets; that heroin, cannabis, and cocaine have similar quantity discounts, and that sellers have consistent access to homogeneous supply (Adler, 1993; Caulkins & Padman, 1993; Reuter & Kleiman, 1986).

That sellers do not consistently re-valuate products as they attain experience may seem counter-intuitive, but simultaneously, expecting an illegal market to behave as a legal one is even less intuitive. As I laid out in Chapter 2, legalization has implications for behavior. In drug markets, it is predominantly the prioritization of risk reduction, for example through credits and discounts to expedite sales (Adler, 1993; Moeller & Sandberg, 2015, 2017), as well as the institutional constraint on prices (Moeller & Sandberg, 2019). In a market so heavily structured by state intervention, there are other ways to reap profits than competing on reputation: Dilution of product, the establishment of repeat partners, and predation (e.g. Adler, 1993; Jacques et al., 2014; Moeller et al., 2017; Naylor, 2003). In a cryptomarket, one may, for example, also choose to source product from a country with a much lower price and then resell domestically (Martin et al., 2020). Furthermore, price is perhaps the least likely contender for reputation effects. Sellers with a high reputation will also have a high turnover, which means increased risk, which should lead to increased discounts (Moeller & Sandberg, 2019). By extension, cryptomarket sellers are only the last links in a global network of producers, traffickers, and distributors, and are therefore left with relatively little "wiggle room" in prices (Adler, 1993; Bright et al., 2019).

Empirically, I have sought to build replication into each research design by contrasting multiple markets when using cryptomarket data (Bernardi et al., 2016). This has shown varying effects, and made it possible to rank the relevance of sources of trust by the weight of the evidence. For example, a consistently significant estimate of past exchanges with a seller versus reputation. The varying effects, however, may also be viewed at a more structural level. In Chapter 3, I suggested differentiating between illicit online markets across axes of governance and marketness, a separation that draws on the market/hierarchy/network distinction and

the notion of varying degrees of market-like conditions (Bichler et al., 2017; Childs, Coomber, & Bull, 2020; Moeller, 2018a). My suggestion is that these varying conditions shape and constrain the potential of individual economic action, but they may do so also within the ideal-types I have specified. That is, whereas cryptomarkets may exhibit high degrees of marketness and governance compared to shops, so may one cryptomarket exhibit higher degrees versus another. The three markets studied in this dissertation, Abraxas, Silk Road 3.1, and Empire may therefore exhibit different degrees of governance and marketness relative to each other. Within the individual papers I have not focused on this aspect, which would require a more detailed operationalization of the marketness/governance differentiation, and preferably multiple markets, but institutional variation is a possible contender for the inconsistency of findings. Without a scheme for ranking markets, and ideally a larger sample of markets, discussion can only be speculative.

Two primary indicators of governance is the centralization of escrow and intervention into exchange by administrators (Odabaş et al., 2017a). Here, Empire distinguishes itself by its sellers offering almost exclusively centralized escrow options, whereas both Silk Road 3.1 and Abraxas show many transactions are outside escrow. In terms of marketness, the number of available products and sellers is a possible indicator. Each increases selection, choice, and comparability, thus increasing competitiveness and calculativeness (Garcia, 1986; Muniesa et al., 2007). In *Risk and Uncertainty*, the variables that are most similar between markets are derived from the reputation system and status levels. The differentiation could suggest that increased marketness would result in a stronger effect of the two, since they are devices that specifically allow ranking. For example, a higher number of sellers catering in a product should increase the efficacy of reputation because there is increased competition. However, in both cases, there is not within-market consistency between expected directions and actual findings concerning the two. Unfortunately, the Empire dataset did not contain enough products requiring advance payment to explore this.



### 10.3 Future research

The simplicity of the conceptual model I have proposed, and the concepts I have developed working towards it, can hopefully inspire future research. Partial findings from the individual papers, as well as other strands of the literature, may also extend the model.

#### Differentiation of illicit online markets

Working towards a conceptualization of trust in cryptomarkets I developed a scheme for differentiating illicit online markets in more general terms in Chapter 3. I suggested that markets may be differentiated across two continua; centralized governance and marketness. The typology is drawn from the literature on illicit markets, online and offline, which struggles with the market/network/hierarchy distinction (Bichler et al., 2017; Moeller, 2018a). However, dating back to seminal works such as Reuter (1984) and Adler (1993), such neat distinctions have shown themselves to be problematic. Markets, even when networked, can show remarkable levels of "free market"-like characteristics. Nowhere is this better illustrated than in cryptomarkets, wherein centralized power supports a drug market with transparency and unprecedented choice (Bakken et al., 2018). Rather than struggling to define whether something is more akin to a network, a hierarchy, or a market, it seems simply easier to accept heterogeneity in forms and compare distinct qualities, a pragmatic approach I suggested in Chapter 2. In illicit online markets, these are, among others, escrow, status hierarchies, product verification, product comparability, and the degree of "legalness" in social control. This is a typology for classification of ideal types, but it may also be applied in a more practical and comparative manner.

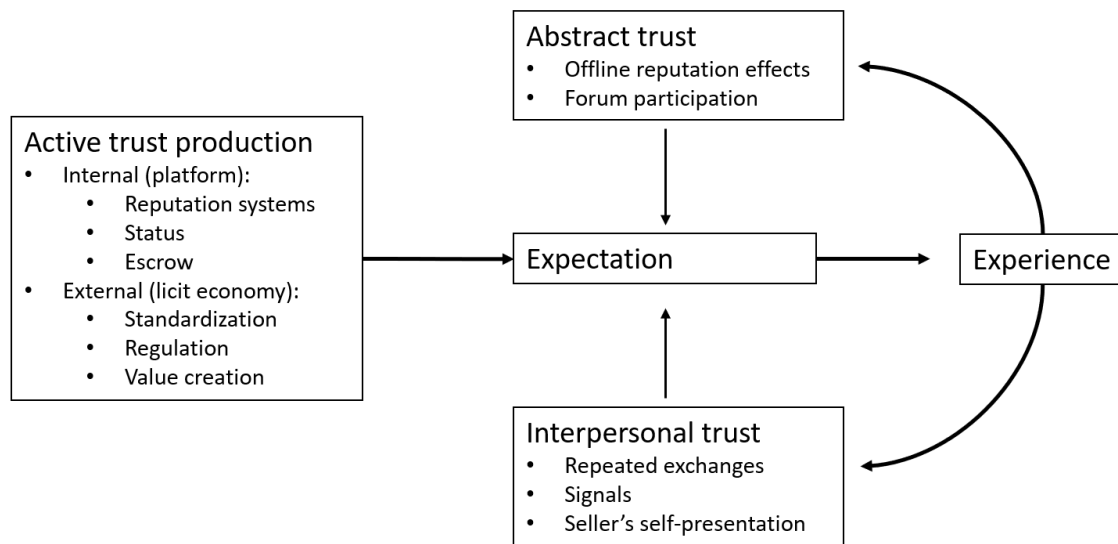
In Chapter 3 I made brief note of the cryptomarket Hydra, which distinguishes itself by providing providing chemical tests of vendors by a centralized authority. Similarly, I drew attention to forum markets which allow a corps of volunteers to operate as mediators in a decentralized escrow system, escrow officers (Lusthaus,

2012). These are characteristics which can distinguish markets within ideal types, and holds the potential for a comparative approach to studying illicit online markets. The typology I developed may be extended based on observing new institutional features (e.g. the centralized testing of Hydra, markets that only allow multisignature escrow), and individual platforms may be ranked according to these. This level may be extended by, as I discussed in the preceding section, drawing attention to within-market characteristics, namely size of the pool of sellers and products (see also Herley & Florêncio, 2010). Further, while the active use of centralized power for the purpose of sanction may be relatively difficult to measure, it would be enlightening to see whether markets differentiate with respect to the severity and swiftness of their sanctioning of sellers and buyers (Moeller et al., 2017; Morselli et al., 2017). Silk Road 3.1, for example, did not immediately take banned seller profiles offline, but instead included an explanation for the cause of the ban. Similarly, the market also banned sellers for small infractions, such as vendors advertising other means to communicate with them. Both would suggest a high degree of exercised social control.

The schema for differentiating illicit online markets may therefore be applied comparatively to analyze how illicit online markets are differentiated. By extension, the axis of centralized governance may also be replaced with the notion of hierarchy (Moeller, 2018a), and it can be applied in illicit markets that exist offline. It is beyond the scope of this work to develop such an application, but the co-existence of high degrees of marketness alongside hierarchical structures, and the tension between "social" and "economic" arenas of exchange observed by scholars, suggests that accepting heterogeneity and the co-occurrence of governance and marketness is fruitful.

### **Future study of the production of trust**

Both the conceptual model and several findings encourage future work. Importantly, the simplicity of the model renders it relatively easy to extend and test. I suggest some concrete applications, based on the findings of this work, and draw



**Figure 10.1** – Conceptual model of how experience informs backdrop and interpersonal trust. Extended to include external influences from the licit economy, signals, offline reputation effects, and forum participation.

attention to some based on existing literature as well. I conclude by discussing alternate measures of trust, and by implication, how trust may be used to understand illicit online markets. In Figure 10.1 these extensions are shown. First, however, it is necessary to highlight some methodological concerns. The application of replication by design is both a contribution and limitation of this work. With few exceptions scholars predominantly study one market at a time (e.g. Décary-Héту & Giommoni, 2017; Soska & Christin, 2015). Arguably, some agendas are limited by e.g. the ability to measure exchange relations (Duxbury & Haynie, 2018a; Norbutas, 2018), but apart from that cryptomarkets and illicit online markets are remarkably similar. Results from this study suggests that despite institutional similarities, however, results cannot necessarily be generalized. This should both motivate the usage of multiple datasets, as well as reconsidering the distinct aspects of individual platforms.

In *A change of Expectations?* we suggested that the propensity for GDS respondents who did not purchase drugs online to state that drugs are of better value, price, purity, and weight, may be influenced by a type of network or reputation ef-

fect. The hypothesis is grounded in the country-level variation in intercepts, shown earlier in Figure 9.3. These show that the mean agreement to the four statements varies across the origin of respondents. This may indicate that abstract trust is also produced offline, through a relatively simple mechanism. Glückler and Armbrüster (2003) discuss types of reputation, stressing the distinction between more or less trusted sources (e.g. Dickinson & Wright, 2015, on drug dealer gossip). It is well-documented that the usage of cryptomarkets differs across countries (Barratt et al., 2014; Demant, Munksgaard, Décary-Héту, & Aldridge, 2018; Dittus et al., 2018), and this may suggest a learning or reputation effect through social networks is in effect (Buskens & Raub, 2002). Significant parts of the lower levels of the drug trade are social, supplied through peers and associates, which includes the option of learning that the supplier procured drugs online (Barratt, Ferris, & Winstock, 2016; Coomber & Moyle, 2014). At present, the GDS does not allow probing this thesis in a more than cursory manner (e.g., the correlation between the percentage of buyers and the sentiment of nonbuyers), but future extensions should include items on the sources of information about illicit online markets, namely peers, and whether their peers use them. Following Callon (1998a), this is another potential overflow. Thus, it is possible that abstract trust is informed through social relations and peers. This does not necessitate abandoning the model, and offline reputation effects may be added as a source of abstract trust (see 10.1).

The finding from *Uncertainty and Risk*, that cannabis sourced from legal sources is priced significantly higher, suggest that some processes outside the market can be conducive to trust. Fanselow (1990) argues that standardization, quality, quantity, and in particular branding, increases the certainty of a good. The products we observed were explicitly marketed as sourced from legal markets, often including a brand. The price difference conforms to the notion of "parasitically" profiting from value creation in licit markets (Beckert & Wehinger, 2013), which functions through standardization, brands, regulation, and so forth (Fligstein, 2001; Timmermans & Epstein, 2010). The economic sociological emphasis on the state as conducive to market order is fruitful here, because it allows us to include the productive function

of the state in the order of the illicit market. Extensions of this thesis can be probed further, in particular since some products originate from the licit market. Products like medicine and tobacco, which are diverted from legal markets and sold online, can retain part of their value because they remain standardized and certain (Joossens & Raw, 2012; Martin et al., 2018). Fanselow's (1990) argument suggests that standardization will have concrete effects on seller and buyer behavior, and thus price and choice are fruitful avenues of research. Norbutas et al. (2020a) use discrete choice modeling to model choice of product and seller, and a similar methodology can be applied to test whether the value creation of the licit market informs choice. Products like diverted medicine, in particular, provide a sufficient basis for such analyses given the size of the supply and demand (Martin et al., 2018; Morelato et al., 2020; Soska & Christin, 2015). The inclusion of the relation to the state is important here, and follows in extension of the framework laid out in Chapters 2 and 4. Certainties do not spontaneously arise, but are produced through social processes like standardization (Beckert, 2009). Consequently, the stability and trust produced by the state can be a resource, rather than exclusively a hindrance, to illicit exchange. Thus, the notion of active trust production may be separated into an external and internal component, of which the former includes processes of standardization, regulation, and value creation, that take place within the licit economy.

In Chapters 3 and 5 I drew attention to some sellers posting lab tests of their products. Such tests may be treated as "signals", information that may be emitted with the purpose of proving trustworthiness (Gambetta, 2009). The notion of signals has received some attention within the study of illicit online markets and has been argued as conducive to trust (e.g. Bakken, 2020; Décary-Héту & Lepänen, 2013; Holt, Smirnova, & Hutchings, 2016). Within the conceptual model, these would be supportive of interpersonal trust, and thus as a way of producing interpersonal trust before attaining experience. The most challenging aspect of signalling theory, however, is that good signals must be costly to fake (Gambetta, 1988b). If a laboratory test can easily, or cheaply, be faked, then showing one is

not a particularly good signal. It is not unlikely, for example, that a seller submits pure product to chemical testing only to sell lower quality product (Caudevilla et al., 2016). Consequently, identifying and differentiating signals necessitates careful analysis.

Attention can also be drawn to forums. While cryptomarket exchange is disembedded from discourse, as opposed to forums wherein the two co-exist, platforms offer forums and buyers also congregate in forums that are unaffiliated with platforms (Porter, 2018; Soudijn & Zegers, 2012). Ladegaard (2020) shows that buyers and sellers use encryption more frequently in forums after crackdowns, and there is general agreement among scholars about the relevance of "community" in a broad sense as enacted in forums (e.g. Bancroft, 2020; Ladegaard, 2019b; Munksgaard & Demant, 2016). Forums, however, remain under-scrutinized when contrasted to stolen data markets in which the content of messages has been analyzed more consistently (e.g. Dupont et al., 2016). Forums associated with the cryptomarket trade are relevant for the study of trust, and suggest two extensions of the model. First, forums are a way of representing one's business, and handling of complaints in a transparent manner (Martin et al., 2020; Morselli et al., 2017). This provides a basis for developing interpersonal trust without exchange, in the same manner as signals. Conversely, the forum, if treated as community, is also a place of discourse and debate (Munksgaard & Demant, 2016). Kamphausen and Werse (2019) highlights the constant negotiation of trust in forums, and it is also possible to draw attention to a more traditional notion of social embeddedness when discussing forums. Here, actors can engage in non-economic action, share trip reports, discuss politics, and so forth (Kowalski, Hooker, & Barratt, 2019). These are activities which bring individuals together, and may be conducive to abstract trust through developing a shared sense of community, similar to how trust in offline illicit markets can be informed by belonging to the same ethnic or cultural group (Schoenmakers et al., 2013). Thus, forums may be operational at both the abstract and the interpersonal level, of which the former can be viewed as participation or usage, a sort of embeddedness within the forum. The latter can be included under a notion of

self-presentation in forums, but need not be isolated to these, as sellers may also use platform profiles to present themselves (Bakken et al., 2018). Consequently, self-presentation is added as an interpersonal source of trust in Figure 10.1 without restricting it to either forum or platform.

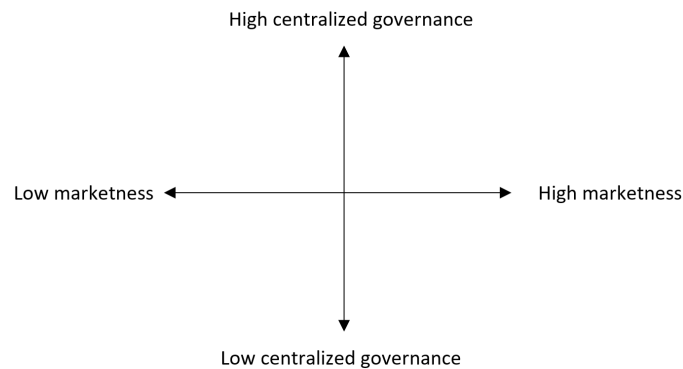
In Chapter 5 I discussed the use of strategic measurements of trust. I chose three, price, cooperation, and belief. Each addresses a different aspect of trust; uncertainty, cooperation, and disposition, and these also reflect disciplinary priorities. Economists prefer price, criminologists prefer cooperation, and sociologists turn to disposition (Lewis & Weigert, 1985; von Lampe & Johansen, 2004). The decision to use different and interdisciplinary measures was motivated by Granovetter's (2017) observation that research agendas tend to reduce trust to one dimension and variable. The downside of this broad approach, is that there are nuances to all aspects that could have been explored further. Concerning price and external influences, signals and alternate products are fruitful avenues of future research. For cooperative ventures, if these are taken as a proxy of trust, escrow and repeat exchanges are particularly interesting. There is already evidence that reputation and experience inform choice of seller (Duxbury & Haynie, 2018a, 2018b; Norbutas et al., 2020a), but none of these studies include escrow or status. Thus, there is room to extend these in a manner that incorporates more sources of trust through network analyses or discrete choice models. If escrow is a crucial device in guaranteeing cooperation, then it may likely influence choice (Bakken et al., 2018; Moeller et al., 2017). Similarly, this also provides an avenue for further testing the relation between status and reputation. By extension, repeat purchases may also be seen as an indicator of trust, and the problem can be reversed to see what explains the return to a seller. Concerning dispositions, the analysis is limited by the GDS dataset (Barratt et al., 2017) and the emphasis on product certainty. Future measurements should explore cooperative uncertainty (Dimoka et al., 2012; Schilke et al., 2016). The most intriguing aspect, however, is to explore the relation between disposition and cooperative measures like tie formation, transaction value, use of escrow, and repeated exchanges (Carlsson et al., 2018; Glaeser et al., 2000).

Finally, the most pressing question in the study of trust remains: What is the relation between cognition and behavior? This work has documented the productive function of behavior, not the opposite direction. I have shown that experience produces beliefs and promotes risky cooperatives ventures, and the question is now what happens next. As discussed throughout this work, particularly in Section 4.4, there is no ideal solution to the study of trust. Behavior can be forced or out of necessity, and beliefs can be vague and only weakly correlated with action (Frederiksen, 2019; Rousseau et al., 1998). We can put people in a lab, but there are limits to what we can learn about trust in illicit markets that way. Rather than pursuing overly complicated ends, I suggest turning towards the mutually constitutive relation between cognition and behavior, and to simply study it in practice. The causal process I have proposed complicates this matter, because it shows that neither belief nor behavior are static sizes. Cooperation hinges on a subjective estimate, but each experience updates this estimate, and thus complicates the active study of trust. The next frontier is to examine how trust influences behavior, but should not be reduced to measuring cooperation. Instead, the priority must be to examine the mutually constitutive relation between cognition and behavior, ideally over time.

#### **10.4 The production of trust in illicit online markets**

Within the preceding sections, I have further developed the thesis of this work, presented and contextualized the evidence in support of it. My thesis begins from the baseline proposition that illicit online markets, in particular cryptomarkets, modernize the manner in which goods are exchanged in illicit markets. This is not a natural occurrence, but the framing of economic action through code, a social construction in the most literal sense. In the cryptomarket; networked reputation is replaced by reputation systems; contracts are offered where none existed before; property rights are specified; courts are erected; judges are chosen; and the premodern trust devices are sought functionally replaced. Arguably, this is not a



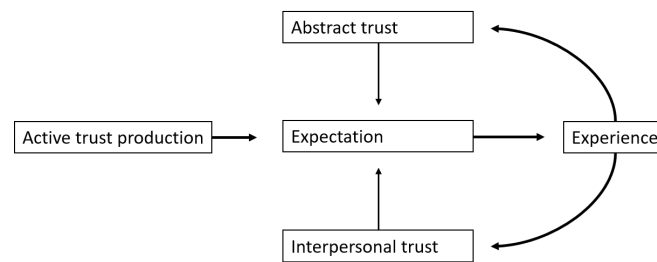


**Figure 10.2** – Axes of differentiation for illicit online markets.

completely modernized market, but it is a radical transformation when contrasted to illicit markets as discussed in Chapter 2. Thus, my point of departure may be called the "modernization thesis"; a radical, yet primitive, social reorganization of the drug market.

This thesis was developed through the application of four bodies of literature; the sociology of trust, theories of social control, criminological research on illicit online markets, and economic sociology. The application of the latter two allowed me to propose a scheme that allows analytically separating illicit online markets with respect to their economic and social organization (reprinted in Figure 10.2). This differentiation was further explored as I argued that cryptomarket frame economic exchange in a distinct manner, drawing upon Callon (1998b). The differentiation derives from Moeller's (2018a) notion of marketness, in combination with a perspective on governance introduced by Odabaş et al. (2017a). Consequently, it is applicable to illicit online markets in general. Outside the scope of illicit online markets, it is one suggestion for how a central theme in the literature on illicit markets, social control, can be reconciled with the community-market continuum (Adler, 1993; Reuter, 1984; Scott et al., 2017). As such, this is a concrete tool that shows the integrative potential of the economic sociological approach.

The scheme, and the notion of framing, also marks my departure from the transaction cost framework, which, despite the emerging economic criminological paradigm, continues to haunt the scholarship (Moeller, 2018a). I do not believe



**Figure 10.3** – Conceptual model of how experience informs backdrop and interpersonal trust.

replacing the framework with coordination problems is the ideal solution either (Beckert, 2009; Beckert & Wehinger, 2013), because these make it as tempting to deduce function from presentation (Bakken et al., 2018; Tzanetakis, 2018b). The danger of either is therefore that empirical observation is reduced to function and complexity is lost. My suggestion, which is particularly applicable online, is to remain more observant towards structure, and especially the ways in which code renders exchange possible. In other words, an institutional component is necessary. I therefore encourage leaving behind the transaction cost framework, and the tendency to a reduced form of functionalism that is also found in the coordination problem approach. The heterogeneity of illicit markets should be the point of departure, and tracing them historically, as I have been done for cryptomarkets, is a powerful analytical tool to understand concrete structures that render exchange possible. Cryptomarkets are unique in that their social origins are well-documented, but beyond that they consist of code and share a cluster of features, as discussed in Chapter 3.

Observant to the presence of governance, I identified, specified, examined, and sought to resolve the Hobbesian problem that haunts the literature on illicit online markets. It is curious that this has not been addressed before, but I suggest this is an unfortunate consequence of disciplinary isolation. As I discussed above, and as was insinuated in Chapter 5, there appears two immediate solutions: Trust and cooperation either flows from self-interest or from centralized power. I proposed a third consisting of two components (reprinted in Figure 10.3).

First, the socially productive function of power should be acknowledged and appreciated. If the notion of order without law is set aside, then power and reputation may simply be subsumed under the notion of active trust production. A practical concept that encompasses various institutional mechanisms that actively support cooperation. There is no reason to consider this as a retreat to Hobbes' solution, as this corresponds to the modernization process within the frame I have proposed (Luhmann, 1979; Zucker, 1986). It simply requires acknowledging that institutions like contracts, sanctions, and courts can support order, even in a primitive form among the outlaws. To acknowledge that the active production of trust seeks to functionally replace the traditional modes of informal social control.

The second component to a theory of trust production in illicit online markets is experience. By acknowledging that trust is, at the individual level, everyday Bayesianism, it is possible to avoid the deadlock introduced as the notion of active trust production encounters markets that are rife with repeated exchanges. Instead, I return to a simple notion of social integration that may be expressed in different ways: The coming together of worlds, internalization, background expectations, experience-based trust, overflow/externality, process-based trust, or social embeddedness. The simple contention is that institutions can only go so far, and that it is through repeated social interaction that cohesion and trust truly emerges. Thus, returning to the questions that motivated this study. Exchange is not only supported by reputation, but also by an ensemble of active trust-producing mechanisms; contracts and status hierarchies for outlaws. Yet, these only constitute the frame, the arena of exchange, a stable world of exchange. Trust, however, increases through a process of social integration.

Finally, it is necessary to highlight the utility of the work beyond cryptomarkets, although I hope it is evident already. Principally, this is a study of the production of trust in three specific illicit markets and a population of buyers. The markets are not identical, that much should be clear when coefficients and descriptive statistics are compared. I have utilized different theoretical approaches, social control theory, the sociology of trust, and economic sociology, but none of these were

designed with illicit online markets at eye. Put bluntly, their application has necessitated grappling with foundational assumptions and key tenets; illicit markets are always unstable (Fligstein, 2001, p. 33); illicit markets are governed by informal social control (Jacques & Wright, 2011; Reuter, 1984); and that social atomization and anonymity are not conducive to trust (Sztompka, 1999; Zucker, 1986). This work seems to have debated each of these assumptions, and hopefully constitutes a minor contribution, or at least a reason to reflect on these assumptions. In the markets I have studied, a formalized type of social control is an active, ordering, and stabilizing presence, and buyers grow more trusting as they exchange.

A continuing thread within this work has been a reliance on an extensive literature on illicit markets, online and offline. This is a purposive choice, because a rigid divide between whether markets are online or offline is unfruitful. Digital dualism serves no one and is unproductive (Jurgenson, 2012). As I showed in Chapter 3, illicit online markets manifest in a myriad of ways, and arguably, while some may be larger or more prevalent than others, these are fundamentally different arenas of exchange. Moreover, disentangling whether something is online or offline seems redundant when Facebook and Telegram are used to arrange drug dealer meetups (Demant et al., 2019), and online drug prices are best explained with reference to geographical origin. It seems more enlightening and fruitful to differentiate markets not according to whether they require an internet connection, but according to their social and economic structure. The economic sociological perspective draws attention to this through notions of institutions as social constructions and framing, and simultaneously provides tools to avoid functionalist dead ends.

## **10.5 Illicit markets and economic criminology**

In the introduction, I discussed reclaiming territory from economists, and I believe this work has shown the potential of such an ambition. The principal challenge to such a project, however, is that there is no criminological theory of illicit markets (Moeller, 2018a; Naylor, 2003). There are distinct tendencies and areas of research

that occupy themselves with illicit markets, but no overarching framework. These tendencies include studies of illicit networks (e.g. Bichler et al., 2017; Bouchard & Ouellet, 2011; Malm & Bichler, 2011), studies of informal social control (Jacques & Wright, 2008, 2011; Moeller & Sandberg, 2017), and Naylor (2003) draws on both economics and crime prevention. Notably, a similar complaint may be levied against economic sociologists, and perhaps even economists, who also refrain from theorizing markets (Krippner, 2001). Research on illicit markets is predominantly generated by criminologists, or close associates, and the economic sociological approach is only a recent intervention (Beckert & Dewey, 2017a; Beckert & Wehinger, 2013). Conversely, the economic literature has fundamentally shaped the criminological study of illicit markets, in particular, drug markets through Reuter's work (Reuter, 1984; Reuter & Kleiman, 1986). The absence of a criminological theory of illicit markets may make it appear as if this work is only found at the outskirts of criminology. I would argue, however, that this work is far more grounded in the fragmented criminology of illicit markets than in economic sociology. If that case is convincing, then the task is not to develop an economic sociology of illicit markets, but an economic criminology thereof. The key components of the modernization thesis, my analysis, and the theoretical framework I have applied, does not emerge from a vacuum, but from a broader literature on illicit markets generated predominantly by criminologists. In this section, I will conclude by highlighting, reiterating, and extending the components on which this work is built, components which I argue can inform an economic criminology of illicit markets.

In both the conceptualization of illicit markets laid out in Chapter 2, and especially in the paper *Uncertainty and Risk*, I stressed that illicit markets do not appear in the absence of a state. This notion is epitomized in the economic risks and prices framework (Reuter & Kleiman, 1986) and self-evident among criminologists. Naylor (2003), for example, differentiates market-based crime as crimes against prohibition, regulation, and taxation. Similarly, studies of illicit markets tend to begin introductory sections by stating that illicit markets exist in an oppositional relation to the state (Jacobs et al., 2000; Jacques & Wright, 2013; Moeller & Sandberg,

2019; Rosenfeld, Jacobs, & Wright, 2003). Of course, studies of the policing and enforcement of law in illicit markets, as well as their effects on individual behavior, revolve around this theme (e.g. Coomber & Moyle, 2017; Dwyer & Moore, 2010a; May & Hough, 2004). In other words, the reversal of the traditional economic sociological contention, that states are constitutive to markets and shape and constrain economic action (Fligstein, 2001), as argued by Beckert and Dewey (2017a), is a curious rediscovery of what is otherwise the standard operating assumption in the study of illicit markets. Moreover, the differentiation of illicit markets on a continuum of legitimacy/legality is analogous to a crime/deviance distinction<sup>1</sup> (Felson, 2006). If a difference has to be identified, it is that these propositions are made explicit, the level of analysis (micro, meso, or macro), and the use of a Weberian notion of legitimacy above deviance. Whether these constitute substantive differences is debatable, but the operational assumption of criminologists is that the state is constitutive of illicit markets and organizations. This is epitomized in the adherence to both the risks and prices framework and informal social control (Jacques & Wright, 2011; Moeller & Sandberg, 2019; Reuter & Kleiman, 1986).

The reversal of the state's productive capacity, as the instigator of disorder rather than order, underlies in particular the article *Uncertainty and Risk*. In studying valuation we examine how disorder is sought resolved through the active production of trust (Beckert & Wehinger, 2013; Zucker, 1986), but the external institutional constraint is not "controlled for". Rather, it is the point of departure. As we incorporate well-documented assumptions about this component into our model; that drug sellers do not have homogeneous supply and that quantity discounts vary between substances, the decisiveness of reputation in price formation withers away. These are not novel, but documented patterns in illicit markets observed by criminologists and economists (e.g. Adler, 1993; Caulkins & Padman, 1993; Denton & O'Malley, 1999; Moeller & Sandberg, 2015, 2019). There remains an abundance of evidence that reputation is conducive to cooperation (e.g. Duxbury

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<sup>1</sup>Notably, in devising this differentiation Beckert and Dewey (2017a) make reference to Matza (2009).

& Haynie, 2018a, 2018b; Norbutas et al., 2020a; Przepiorka et al., 2017), and as suggested earlier, perhaps pitting reputation against the complex dynamics of drug prices is a bit too optimistic. The crucial lesson, however, is that the illegality of exchange must not be treated as a state of non-interference (Hardy & Norgaard, 2016; Przepiorka et al., 2017), but as constitutive, restraining, and enabling. For example, it may well be that reputation is the ideal means of competition in a market under some external control with regards to quality and regulation (Diekmann et al., 2014; Resnick et al., 2000), but when restrictions on fraud and predation are lifted competition does not need to be between sellers (Fanselow, 1990). That there are other ways to make a profit is suggested by our findings, which identifies significant premiums on baking powder when combined with cocaine to produce crack (see Table 7.III). This attentiveness to the constitutive role of the state is one of the most crucial insights of the fragmented criminology of drug markets, whether it from the perspective of illicit networks (Bichler et al., 2017; Bright et al., 2019) or informal social control (Jacques & Wright, 2008, 2011; Rosenfeld et al., 2003). This dimension may be recognized by economic sociologists (Beckert & Dewey, 2017a; Beckert & Wehinger, 2013), but its intricacies and complexity is underappreciated (e.g. Przepiorka et al., 2017). This assumption can be termed the "institutional constraint" (Moeller & Sandberg, 2019) and reiterated as such:

1. Illicit markets exist in relation to the state. The state is constitutive of their illegality, and a crucial actor in their delegitimization.

This work provides evidence that this proposition is utile in *Uncertainty and Risk*, which identifies the risks and prices framework as the principal driver of drug prices. It is an evident assumption, but crucially, as I have argued, this is an insight which is most strongly advocated by criminologists in the study of illicit online markets (Cunliffe et al., 2017; Moeller et al., 2020). This is a macro-level assumption, with repercussions at the meso- and micro level.

Whereas criminologists and economic sociologists may find common ground on the subject of the productive capacity of the state, it remains the domain of

criminologists to address power in their analysis of illicit markets. Frequently, community, interaction, cohesion, and mutual interests figure as explanations for the social organization of illicit online markets (Bancroft et al., 2020; Kamphausen & Werse, 2019; Tzanetakis, 2018b, 2019). Other times, social control is reduced to the reputation system (Eschenbaum & Liebert, 2019; Hardy & Norgaard, 2016; Przepiorka et al., 2017). Chapter 3 revolved around a discussion of the social organization of illicit online markets, and power and control were key points of departure. This is a topic which particularly scholars of cybercrime and stolen data markets have concerned themselves with, and while there is not an overarching framework there is an attentiveness to power and control that is crucial. Lusthaus (2012, 2013) draws attention to the role of administrators in establishing trust, and draws comparisons to organized criminal groups. Dupont et al. (2016) note that administrators remain in control of servers. Bakken et al. (2018) and Moeller et al. (2017) highlight the uniquely hierarchical nature of online drug markets, and Odabaş et al. (2017a, 2017b) draw attention to the continuum of governance and the distinct functions exercised by administrators. There may not be a theory of social control or power that these studies adhere to, but there is nearly unanimous agreement that power relations are crucial to understanding illicit online markets. This attentiveness may be ascribed to social control as a key pillar of the criminology of illicit markets (e.g. Bouchard et al., 2020; Jacques & Wright, 2011; Moeller & Sandberg, 2015).

Throughout this work I have emphasized the productive capacity of the administration in illicit markets. In Chapter 3 I suggested differentiating between markets based on their level of centralized governance, and I suggested that contrary to expectation hierarchy and marketness were not incompatible (see also Bakken et al., 2018). Chapter 5 extended this argument, and I posited the administration as a crucial source of trust in cryptomarkets. Notably, this dimension is relatively unaddressed in studies of cryptomarkets (notable exceptions are Bakken et al., 2018; Moeller et al., 2017; Morselli et al., 2017), whereas it border on commonsensical in the study of other illicit online markets by criminologists. The conceptualiza-



tion of trust in illicit online markets I proposed, in which the active production of trust is a crucial element, is therefore not an intervention based on the sociology of trust or economic sociology. Rather, I have appropriated their concepts to synthesize what is a common sentiment; that the social construction of illicit online markets produces distinct power relations which can be conducive to trust by promoting orderly exchange. Social control theory and its application in illicit markets highlight the productive capacity of such relations (Black, 1983; Jacques & Wright, 2011; Moeller, 2018a), and if the rigid distinction between formal/informal control is disregarded (J. Griffiths, 1984), then the sociological notion of functional replacements to premodern bases of trust similarly provides a concept for what is observed (Luhmann, 1979; Zucker, 1986).

Thus, the interjection that the internal governance of administrators cannot be ignored is only an extension that comes naturally from an occupation with traditional illicit markets and social control. Black's (1976) theory of social control implies that in the absence of law there must be some mode of conflict resolution. Because illicit markets are heterogeneous such means span violence, threats, and informal mediation (Dickinson, 2017; Levitt & Venkatesh, 1998; Reuter, 1984). The natural inclination of a criminologist who observes an illicit online market is therefore an attentiveness to the alternate means of social control utilized to support market order, whereas the economic sociologist is drawn towards norms, culture, and institutions (Tzanetakis, 2018b, 2019). In my analysis, the social construction of the cryptomarket was central. While it may be that the notion of institutions as social constructions is drawn from sociologists, the identification of its distinguishing characteristics was based on a body of criminological research on illicit online markets within the same institutional environment. Thus, I reiterate that:

2. Illicit market institutions, patterns of norms and behavior, are heterogeneous. They do not arise exclusively from processes of competition, evolutionary pressure, or economizing, but are social constructions.

Moeller (2018a) wrestles with the problem that illicit markets span the continuum from "free markets" (Adler, 1993; Reuter, 1984) to noneconomic exchange among friends (Sandberg, 2012; Scott et al., 2017). This differentiation is hard to reconcile within the transaction cost framework of markets and hierarchies, and thus the network is proposed as an intermediate form. The problem is, however, that adaptive stories are told as easily (Granovetter, 2017): Exchange is embedded in networks to reduce opportunism; exchange is in the street to increase efficiency, and so forth. Furthermore, as illicit online markets demonstrate, hierarchies are perfectly compatible with high efficiency/marketness and hierarchy/governance. A pragmatic solution is to abandon the transaction cost reasoning, and simply recognize that markets are heterogeneous. They may still be appreciated by their characteristics, hierarchy, network, or marketness, but these are not constrained to efficiency/security optimizations. Furthermore, the social processes that precede their emergence, their stability as social institutions, and their history can be appreciated in full. As I argued in Chapter 3, this approach provides a story of cryptomarkets that can include both their hierarchical and market-like characteristics. This pragmatic approach, I suggest, is encouraged by the diversity of institutional and organizational forms of illicit markets and firms within them; narratives of friendship, suburban drug markets, violent street markets, insurgent control, social supply, and peaceful street markets (Coomber & Moyle, 2014; Hirata & Grillo, 2019; Jacques & Wright, 2008, 2015; Scott et al., 2017). Scholars may well continue to examine responses to enforcement, but they need not be limited to exclusive classifications (Bichler et al., 2017; Naylor, 2003).

Finally, it is worth returning to exchange as a crime. In Chapter 2 I discussed what distinguishes the crimes of illicit markets from other crimes: These do not necessitate force or fraud against other person and they can produce value (Naylor, 2003). Returning to Callon's (1998a) notion of an overflow it is possible to suggest a third distinction, market-based crimes not only produce concrete value, they also produce trust. In both *Building a Case for Trust* and *A Change of Expectations?* we observe that the primary crime of illicit markets – exchange – produces

an overflow, trust; the propensity to take risk and the abstract generalized belief in the honesty of others emerge. This results in a curious and confusing realignment of the relation between trust and crime. Trust is, as discussed in Chapter 4, a subjective estimate of the other's future honest behavior (Sztompka, 1999). It is specifically, the anticipation of norm-abidance and non-deviance. Predatory and fraudulent crimes, and crime in general, are conducive to distrust (e.g. Wu, 2020). Yet, market-based crimes, which are neither fraudulent nor predatory but crimes against regulation, are conducive to trust among outlaws. In fact, they have developed a sophisticated institutional framework that reduces force and fraud, deviance, by institutionalizing the secondary social control crimes that support exchange. The propositions of Chapter 2 may therefore be reiterated and extended as such:

- 3.1 Exchange is socially embedded.
- 3.2 Exchange, and related primary crimes (market-based crimes such as exchange, production, distribution, transport), are distinct crimes because they do not necessitate force and fraud against participants.
- 3.3 The absence of formal social control in illicit markets leads to an increase in informal social control. Secondary crimes of social control and self-help may be seen as functional replacements to formal law.
- 3.4 Both primary and secondary crimes are productive. They may produce monetary and nonmonetary value.

Thus, a distinction between the crimes of illicit markets may be proposed; primary crimes that create value, and secondary crimes that resolve conflicts. This builds on the work of Naylor (2003) and Black (1983). In Section 2.5 I argued that if value-judgements are ignored, then these crimes are productive: One produces value, the other produces stability (Black, 1983). Both may also be argued to produce an overflow of social variables, status, reputation, friendship and so forth

(Bourgois, 2003; Denton & O'Malley, 1999; Sandberg, 2012). The organization thereof may be exploitative (Coomber & Moyle, 2017; Reuter, 2009), communitarian (Scott et al., 2017), or authoritarian (Gutiérrez D. & Thomson, 2020), but that is a question of the social construction of the market and organization, thus connecting the micro and meso level (Granovetter, 2017, chapter 1). Importantly, if the meso-level of markets and institutions is not seen as a functional response to enforcement, then the variety of primary and secondary crimes is easier to appreciate. The FARC-EP guerrilla's policing and regulation of the coca trade is not a response to institutional constraint, but rather a mode of resolving it in a manner that varies in terms of efficiency and hierarchy (Gutiérrez D. & Thomson, 2020). Similarly, the crimes of illicit online markets are "framed", not functional responses (Callon, 1998a). Here, the connection to Black is clear, it is the social structure that determines the mode and manner of social control (Black, 1976, 1983, 1990). A fruitful approach to illicit markets and organizations is therefore to consider them as social construction under institutional constraints that shape, enable and constrain primary and secondary crimes.

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