INSTITUTIONS AND DRUG MARKETS

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This thesis examines how drug policy and enforcement affect drug manufacturers. The approach taken is a comparative institutional analysis of cannabis and methamphetamine production. I focus on the effects of prohibition, privacy, and clandestine markets on producer behavior for these two drugs and the unintended consequences that result. I demonstrate that cannabis and methamphetamine producers both face substantial transaction costs and that producers alter their behavior to manage these transaction costs. I conclude that cannabis producers can adopt indoor, small-scale operations to hide their activity, which are capable of yielding continuous, high-potency crops. Methamphetamine producers also adopt small-scale, decentralized strategies, but commodity control increases their exposure and leads to greater overall transaction costs during the manufacturing process.
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INTRODUCTION

How do drug policy and enforcement affect illicit drug manufacturers? The role of a producer in any market is to bring a good into existence, and in no case is this more complex than the underground markets for illegal drugs. Despite local, state, and federal drug policy and enforcement efforts, illicit drug manufacturers continue to operate within the United States. If we consider drug policy and enforcement only as they prohibit drug manufacturing, then we ignore the unintended effects that these institutions may have on people who choose to evade them. This thesis discusses the relationship between illicit drug manufacturers and the institutions that exist to restrict their behavior.

Few analyses contribute to the broad theoretical understanding of drug markets and their individual participants. This is because many drug market researchers focus on consumption and distribution, while neglecting the behavior of suppliers. For example, it is beneficial to know how many high school seniors can obtain a particular drug within a given time period (Johnston, O’Malley, Bachman, and Schulenburg 2003), but who produced that drug? How is it that a drug can go from producer to a twelfth grader without signaling law enforcement agents? Is the producer also a distributor, or is he or she part of an informal drug organization? Did the producer commit other crimes during the production of a drug? Questions about illicit drug manufacturing cannot be answered with direct quantitative analyses because it is an activity that relies upon the nondisclosure of information to take place. The problem of illegal drug manufacturing resides with those producers who may never be caught, which despite political and law enforcement rhetoric, is the reality of the situation.

The problem social scientists face when addressing the illicit drug phenomenon is that a substantial lack of data prohibits us from creating a traditional economic theory about
clandestine drug markets. In an underground economy transactions are hidden, so helpful quantitative measures, like supply, demand, and price are not reliable or readily available. Illicit drug production is a secretive process, so there is no accurate way of determining the quantity of drugs available in a market and thus also the effectiveness of drug prohibition. Without reliable data it is also difficult for policymakers to create legislation that can quell this type of behavior. In order to develop effective drug policy and enforcement institutions that are capable of systematically diminishing illicit drug markets there must be an understanding of drug manufacturer behavior and the conditions that affect it.

The approach taken in this thesis is one that highlights the relationship between drug policy institutions and drug market behavior. Drawing from the New Institutionalist school, I examine how rules and enforcement mechanisms affect the decisions of drug manufacturers. Central to the analysis is attention to the way these institutions shape critical non-monetary factors that influence the choices and behaviors of drug manufacturers. These factors include transaction costs, particularly those affected by risk and information, which cannot be measured directly. Herein, risk is the probability that the producer will be discovered by law enforcement agents.

In illicit drug markets, the risk that monitoring and sanctioning adds to production requires that manufacturers take extra efforts to produce their goods. There are certain measures that producers must take to successfully create drugs, such as hiding the operation, learning production methods, and acquiring controlled ingredients. These are transaction costs, which are not part of the material costs of production. Transaction costs for these activities increase and decrease depending upon the characteristics of the good being produced and the ways law
enforcement agents monitor and producers. By highlighting how institutions affect such factors I will provide insight into why drug manufacturers behave as they do.

At the individual level, drug manufacturers must make a number of decisions about how they will produce controlled substances. Not only do they choose what drugs they will make, but they also must decide where and how they will make them, what resources and inputs they will use, and what quantity they will produce. Their choices on all these issues must be informed by consideration of the necessity to evade law enforcement agents and concerned citizens. There are varying levels of risk associated with each production decision. In this sense, risk and efforts to minimize it are key factors shaping producer activities.

The goal of legislation and enforcement is to inflate risk for producing illicit drugs above the expected payoffs rewarded for the behavior. Logically, this works because prohibitionist laws stipulate punishment in terms of fines and sentences, which are enforced if an individual is detected during or after committing a drug crime. The common expectation is that individuals weighing the choice of producing a drug have to consider the loss of assets and free time that could potentially result from their decisions. In order to be credible, this threat of punishment must be implemented by an enforcement mechanism with the authority and ability to monitor individuals attempting to evade these institutions. But law enforcement agencies at the local, state, and federal levels vary in their ability to detect illicit drug production, and some drug manufacturers are highly skilled at hiding or moving their operations to avoid detection. Because drug manufacturing laws cannot yet be enforced perfectly, we must assume that some individuals manufacture illicit drugs without being caught. For these individuals, drug prohibition is not absolute. Rather, prohibition is probabilistic; it is subject to the abilities of law enforcement agents and the skills of the individuals evading enforcement.
Many drugs are synthesized from chemicals or extracted from various substances; others are consumed in the natural state in which they grow. As a result, some drugs have more complicated production methods than others, and they may require the manufacturer to acquire information, like instructions or training. The costs of information come from the complexity of the drug’s manufacturing process, and the effort required for obtaining the information necessary for production. The properties of a drug can also contribute to risk because some drugs are easier to hide than others during production.

The transaction costs created by risk and information costs, though they cannot easily be quantified, are a result of the institutional structure formed around drugs and their production. In this respect, institutions represent part of the puzzle as to why producers behave as they do. Taking this approach builds on a well-established line of thinking associated with the New Institutionalist school of thought.

Institutions are the rules and enforcement practices that emerge around, or are imposed upon, social activities. As Hall and Taylor explain, institutions are the “formal or informal procedures, routines, norms, and conventions embedded in the organizational structure of the polity or political economy” (Hall and Taylor 1996, 938). Institutional analyses have been applied by many social scientists to understand various rules and their effects on individual behavior when data are not accessible. Douglass North and Robert Thomas, for example, use an institutionalist perspective to show how efficient organization led to the rise of Western Europe (1973). North and Weingast also use an institutional approach to describe the evolution of constitutional arrangements in seventeenth-century England (1989). In other research, Kathryn Firmin-Sellers analyzes institutions as they shaped class development in Ghana and the Ivory Coast (2000). I begin by showing how these authors use institutional analyses to answer their
political-economic questions, and then I will discuss how such an approach can contribute to the
issue of drug manufacturer behavior.

In *The Rise of the Western World: A New Economic History*, North and Thomas argue
that, “efficient economic organization is the key to [growth, and] the development of an efficient
economic organization in Western Europe accounts for the rise of the West” (1973, 1). Like the
issue of contemporary drug markets, economic organization and growth from the 10th to 18th
century cannot be addressed solely by quantitative economic analyses because there is little if
any statistical data available. Instead, they discuss the structure of property rights (an institution)
and how they contribute to economic growth. North and Thomas show that individuals need
incentives to undertake socially productive activity, such as the protection and enforcement of
property rights on behalf of a government. Because governments have financial needs of their
own, they may usurp individuals’ property rights in order to meet those needs. As the authors
state, “the fiscal needs of government may induce the protection of certain property rights which
hinder rather than promote growth; therefore we have no guarantee that productive institutional
arrangements will emerge” (North and Thomas 1973, 8). North and Thomas then go on to
discuss different institutional arrangements, such as feudalism and royal absolutism, and how
these institutions led to different forms of economic behavior because of the different costs (i.e.,
risk and other transaction costs) that they presented to individuals.

Institutional arrangements, in the most basic sense, can be seen as the structure of rules
and enforcement mechanisms which allow or forbid individuals to undertake various activities.
Feudalism, for instance, emerged as the dominant institutional arrangement in 10th century
Europe. At this time, there were few markets for goods, and fiefs were scattered about the land.
The serfs’ exchange of labor for the use of a lord’s land and equipment constituted early
institutions (North and Thomas 1973, 10). North and Thomas state, “the customs of the manor became the unwritten ‘constitution’, or the fundamental institutional arrangement of an essentially anarchic world, more properly viewed as small isolated settlements, frequently in the lee of a fortified place and surrounded by wilderness” (North and Thomas 1973, 11). The rules of these systems shaped the economic growth of early Western Europe via property rights, governmental enforcement, and the reciprocal economic choices made by individuals. Eventually, feudalism and similar systems evolved into market-based institutional arrangements as agrarian Western Europe grew into a more industrial socioeconomic system.

The question of institutions, property rights, and economic behavior also arises in “Constitutions and Commitment: The Evolution of Institutions Governing Public Choice in Seventeenth-Century England,” (1989) by North and Weingast. The theme of this work is that “successful long-run economic performance requires appropriate incentives not only for economic actors but for political actors as well” (North and Weingast 1989, 806). The Stuarts, who came to power in the early 17th century, sold monopoly rights as a method of raising funds for the Crown. This did not have much of an effect on government revenues, but it did have an impact on economic growth because individuals then had little incentive to invest in their own enterprises. North and Weingast write, “Monopoly grants thus acted like a tax that, since it expropriated the value of existing investment as well as future profits, was considerably greater at the margin than a 100 percent tax on profits. This risk lowered the rewards from all such new investments and hence discouraged their undertaking” (1989, 811). After the Glorious Revolution in 1688, new institutions emerged to solve “control over the exercise of arbitrary and confiscatory power by the Crown” (North and Weingast 1989, 804). Once a system of checks and balances was put in place to offset the powers of Parliament and the King, research and
development resurfaced in Britain as individuals were more willing to invest time and money in profitable enterprise without the threat of their property rights being stripped by the government.

Much like North and Thomas’ 1973 piece, “Constitutions and Commitment” (1989) discusses the effects of institutional arrangements on the desire or ability of individuals to undertake the necessary steps for economic advancement. Both works show that economic development requires a sociopolitical structure that values property rights and the personal investments of individuals. Property rights are the privileges of ownership—the rights to produce, possess, use, and distribute property. North and Weingast’s piece adds that not only must a government “merely establish the relevant set of rights, but [it] must make a credible commitment to them” (1989, 803). The authors show that economic growth can only occur if there is an allowable set of valuable outcomes available to individuals and they believe that they can achieve them. I return to the idea of an allowable set of outcomes shortly.

A final example of how institutional analysis has been used to explain individual behavior where data are not readily available is “Institutions, Context, and Outcomes: Explaining French and British Colonial Rule in West Africa,” by Kathryn Firmin-Sellers (2000). She addresses the question of class formation as it emerged out of the different economic policies of colonial producers in the Ivory Coast and Ghana. The author uses principal-agent theory to describe “the conditions under which a principal (here, European colonizers) chooses to delegate authority to an actor or actors (indigenous chiefs), who then serve as the principal’s agent” (Firmin-Sellers 2000, 255). Firmin-Sellers demonstrates how the principal designs institutions to minimize losses. She argues that French and British colonizers designed different institutions to regulate principal-agent agreements and that “these variations profoundly influenced the response of the indigenous chiefs and, by extension, of the individual subjects to colonize and
later to the commercialization of the indigenous economy” (Firmin-Sellers 2000, 256). Through comparative institutional analysis the author shows that French colonial institutions in the Ivory Coast supported “promarket, proagrarian policies,” while British institutions created a “small peasantry” that was unable to challenge the statist, urbanist policies that emerged in Ghana (Firmin-Sellers 2000, 268). Like North, Firmin-Sellers sees institutions as part of the causal explanation for social outcomes—class development in her case. She also sees the causal mechanism as the impact that institutions have on the incentives that present themselves to individuals and the ensuing choices they make.

Firmin-Sellers’ distinct contribution is in her reinforcement of the need to analyze the myriad institutions in which individuals operate (2000, 269). As she explains, “…nested institutional arrangements can place conflicting pressures on individual actors. An action that is permitted under one arrangement (tax collection, for example) may be prohibited under another. Individual behavior (corruption or faithful patronage) reflects the actor’s (in)ability to balance competing demands” (Firmin-Sellers 2000, 269). This understanding of overlapping institutions is vital to the question of drug manufacturing because as a type of economic behavior, illicit drug production has its own institutional structure, albeit informal, that coexists with anti-drug institutions imposed by the government. As such, illicit drug manufacturers operate within their own system of rules and incentives that are contradictory to mainstream prohibitionist institutions. There are also the institutional arrangements of privacy rights, which restrict the monitoring and sanctioning abilities of law enforcement agents. Firmin-Sellers suggests that, “too often, institutional analysts focus only on an institution’s direct effect, concentrating, for example, on the way state institutions affect elite decision makers. [The Ivory Coast and Ghana] case studies demonstrate the importance of indirect effects, of the way actors respond to the
state. New Institutionalist scholars would do well, then, to expand the scope of their inquiry to ask how institutions alter the relationship between state and society, and with what consequences” (2000, 269).

Institutional arrangements can have direct and indirect effects on individual behavior. Because illicit drug manufacturing takes place in the course of evading drug policy and enforcement, we can consider this behavior as an unintended consequence of institutional arrangements. Firmin-Sellers discusses three main causes for the unintended consequences of institutional arrangements: “…first, because actors work within multiple sets of institutions. Actions rewarded under one institutional arrangement may be penalized under a second, or actions permitted under one institutional arrangement may interfere with actions more highly rewarded under a second” (2000, 253). Drug policy and enforcement create one set of institutional arrangements that prohibit individuals from committing drug crimes, these same activities can earn substantial rewards in drug markets.

Firmin-Sellers continues, “…institutions have unintended consequences because they exert both direct and indirect effects upon individual behavior” (Firmin-Sellers 2000, 254). The direct effects of drug policy institutions are evident in the majority of individuals who refrain from manufacturing illicit drugs, but the indirect effects can be seen in underground drug markets, organized crime, gang violence, and increasing numbers of arrests, prisoners, and law enforcement agents.¹ Prohibiting illicit drug activity creates the opportunity for individuals to

¹ There is much evidence of an expanding clandestine drug economy in the United States. From 1980 to 2001 the total number of arrests for drug-related crimes increased from 580,900 to 1,586,900, and the number of individuals incarcerated for drug offenses rose from 19,000 to 249,100. From 1982 to 2002 the number of arrests for drug sale or manufacturing rose from 137,100 to 303,100, and the number of arrests for possession rose from 538,100 to 1,235,700 (ONDCP 2001, Drugs and Crime Facts). At the current rate, the United States arrests roughly the equivalent of Philadelphia’s population every year for drug-related offenses. Most of the arrests and incarcerations are for possession charges, but these crimes can only be committed after drugs are produced.
develop their own informal ways of defending their property rights to drugs, which can be unpredictable and violent.

The nature of law enforcement also contributes to the unintended consequences of drug prohibition. This is because law enforcement coverage varies from location to location, and it cannot yet detect every drug criminal. As Firmin-Sellers explains,

...institutions have unintended consequences because actors may choose to evade and undermine these institutions. An actor’s capacity to evade an institution depends in part upon the nature of the institution itself. Actors are more likely to evade an institution if the institution is incomplete or ambiguously defined. An actor’s capacity to evade also depends upon other actors. Actors are more likely to evade an institution if community members perceive that institution as illegitimate or if the institution’s supporters lack sufficient resources to monitor and sanction deviant behavior (Firmin-Sellers 2000, 254).

A drug-market actor requires only one successful instance of committing a crime to be convinced of prohibition’s insufficient enforcement resources. The agencies responsible for drug enforcement comprise an enormous enterprise, but it cannot monitor every instance of drug-related crime. This is partly a result of the right to privacy, which limits law enforcement coverage to outside of the home unless a reasonable suspicion can be established about an illicit activity.

The Rise of the Western World (1973), “Constitutions and Commitment” (1989), and “Institutions, Context, and Outcomes” (2000) all address individual behavior as shaped by institutional arrangements. The former two examples show how political institutions, such as feudalism, royal absolutism, and constitutional monarchism, shape economies by guaranteeing and protecting property rights and that the absence of property rights can have detrimental effects on economic growth. The latter example shows how different sociopolitical institutions affect patterns of class formation, and that the enforcement of rules is inseparable from their evasion. Moreover, Firmin-Sellers suggests that institutions may have unintended consequences because
they can overlap, they can have direct and indirect effects on behavior, and they can fail to carry out their objective.

Just as the works of North and Thomas, North and Weingast, and Firmin-Sellers use transaction costs as a basis of analyzing the effects of institutional arrangements on economic development in Europe and Africa, I will focus on transaction costs as a basis for comparing the effects of prohibitionist institutions on producer behavior for two illicit drugs. Building from Firmin-Sellers’s work, my framework begins from the premise that individuals who manufacture illicit drugs operate within at least three overlapping institutions: (1) drug policy and enforcement, (2) the constitutional right to privacy granted by the Fourth Amendment, and (3) the market forces that reward drug producers with a financial payoff. Illicit drug manufacturers are compensated by illicit drug markets (i.e., exchanging drugs for profit), but they are punished if they are discovered by law enforcement. This creates the incentive for individuals to hide their behavior. In turn, the right to privacy provides a tool for drug-market actors to hide their activity in locations that are off-limits from law enforcement agents. In this respect, the individual’s right to privacy and the cash market for illegal drugs conflict with prohibition institutions. The institutions of drug policy and enforcement restrict and punish behavior that is otherwise promoted and protected by a second and third set of market institutions. Although market institutions are informal, they provide an incentive structure that rewards individuals for evading prohibition similar to the way the informal customs of the manor provided an unwritten constitution for peasant farmers in feudal Europe.

Yet as North and Weingast illustrate, institutional arrangements have effects on behavior not simply by prescribing, protecting or prohibiting certain forms of behavior, but via their impact on transactions costs that present themselves to economic actors. Indeed, much of North’
work is devoted to unearthing how institutions can reduce transactions costs (such as the need for information) thus making economic activity more efficient. But his work also suggests that institutional arrangements can increase transactions costs, and hinder the development of economies. For example, as I described earlier, North and Weingast indicate that monopoly grants issued under the Stuarts acted like a tax on technological investments. Building from this view of institutions, it is feasible that the impact of prohibition on illicit drug markets also acts as a tax by increasing the transaction costs of drug market activity via risk and information costs.

In mainstream economies, the transaction costs associated with producing, distributing, and buying goods are often neglected because they are minimal. The costs incurred by the consumer when locating goods, for example, are comparatively low in developed economies, where firms have an incentive to make their presence and their goods known to potential customers. In the drug manufacturing process, however, individuals try to hide their efforts because law enforcement agents are continually working to restrict their behavior. If producers of illicit drugs also wish to sell them, they cannot overtly advertise their activity without potentially signaling law enforcement agents. In illicit drug markets the incentive may exist for producers to advertise in order to sell their goods, and they may also have an incentive to ship their goods to markets to meet demand; but the manner in which they do so must subvert the attention of law enforcement agents and minimize risk. These efforts to evade law enforcement and minimize risk represent transaction costs that are incurred by drug producers. Additionally, producers who require external resources, such as ingredients and instructions, may not be able to acquire them easily from a distributor. Since many ingredients have recently been restricted as precursors to various illicit drugs, producers must work harder to find and obtain them. While the
monetary costs for drug production may be insignificant, the costs in terms of time and effort may be substantial.

The key focus of this thesis is how overlapping institutional arrangements affect a drug manufacturer’s behavior via transaction costs, such as those associated with risk and information. Drug policy limits an individual’s options by promising a penalty to any individual caught producing drugs. However, if demand exists to the extent that an individual can receive compensation for evading the law and producing a drug for sale (or even for sustainable consumption without payment), then it is the job of law enforcement agents to monitor and sanction this behavior. The right to privacy overlaps prohibitionist and market institutions and provides a buffer-zone in which drug production can be hidden. In some instances, individuals can minimize risk by selecting methods of production that can be undertaken with strict secrecy inside their zones of privacy. But all of this takes time and effort that represent transaction costs for the producer thus informing the kinds of decisions they make about production methods.

Notably, although the focus on institutions is central to this thesis, the analysis proceeds cognizant that institutional arrangements are only part of the decision making process for illicit drug manufacturers. Drug manufacturing is a process comprised of a number of steps rather than one simple act. Some illicit drugs are plants that can be produced via cottage industry, requiring only natural resources for their growth; and other drugs require scarce external inputs to be produced. Manufacturers of industrial drugs require commodities produced by other entities. In this respect, it seems reasonable to assume that their choices will be shaped not only by various drug policies and enforcement mechanisms, but also by the nature of the products they are creating and the markets for those products. It is the interaction of these factors—institutions and
other aspects of drug production—that determine the choices of these actors and the growth or shrinkage of the illicit drug economy at large.

Throughout the remainder of this thesis I will demonstrate how manufacturer behavior is affected by the institutions of drug policy and enforcement. I examine how transaction costs are magnified by risk and information costs and how manufacturers minimize these costs. The focus of the analysis is on producer behavior in the market for cannabis and methamphetamine. I will show that institutions and the production processes peculiar to the drugs generate different kinds of producer strategies, each with potential consequences for these markets. Specifically, I will show how institutional factors result in cannabis manufacturers choosing small, indoor, and independent production strategies. Such strategies are difficult for law enforcement officers to counter and are only minimally inconvenient for producers of cannabis. They generate few costs and challenges for producers, suggesting that cannabis market activity may continue to flourish. Then, I will explain how similar institutional arrangements contribute to small-scale and decentralized strategies for methamphetamine producers. But, in contrast to the situation for cannabis producers, these production strategies are quite suboptimal and continue to be characterized by high overall transaction costs. Part of these differences reflects the fact that cannabis production is more difficult to monitor and sanction than methamphetamine production. Because drug policy and enforcement are only as good as their monitoring and sanctioning mechanisms, these drug manufacturers have many opportunities to elude police. Those who are willing to afford the risks of the activity and play the probability game of production stand to gain substantial rewards, but it is the institutional structure in which these individuals operate that creates this condition.
To summarize, my goal is to make sense of drug manufacturer behavior as conditioned by the institutional framework in which they operate. Ideally, an essay on illicit drug market behavior would address the behavior of all drug-market actors—producers, distributors, and consumers. Here, I only discuss institutions as they affect manufacturers, which, nevertheless, is a significant part of the illicit drug problem. My approach incorporates institutional mechanisms and aspects of illicit drug production, including physical characteristics of the drugs, costs and availabilities of inputs, the use of information, and whether drugs are intended for sustainability or sale. With this perspective, I provide insight into the relationship between prohibitionist drug institutions, transaction costs, and illicit drug manufacturers. Where available, I use first-hand examples with individuals who have produced illicit drugs and from other people in the field. I include personal interviews from a criminal attorney with experience as an Assistant District Attorney and a Louisiana State Senator; a police sergeant and former member of the North Central Texas Narcotics Task Force before it disbanded in 2004; and another police officer, who was an agent for the Drug Enforcement Administration (DEA). I also draw examples from other state and federal agencies and a number of print sources, which I will cite accordingly as they become relevant throughout my comparison.

This thesis continues in the following manner: In the next two chapters, I analyze cannabis and methamphetamine production and their different policy and enforcement institutions. I discuss the requisites of the production process, the punishments that are specified for the production of each drug, and the monitoring efforts of law enforcement. In the concluding chapter, I compare the effects of prohibitionist institutions for each drug and the resultant behavior of producers. I close with the merits and limitations of my approach, and some suggestions for future research.
ANALYSIS OF CANNABIS PRODUCTION

The goal of this thesis is to answer the question of how the institutions of drug policy and enforcement affect drug manufacturers’ behavior. In this chapter, I examine the institutions of cannabis prohibition, privacy rights, and the market for this drug. Specifically, I look at how these institutions affect transaction costs for cannabis producers and how producers respond to these transaction costs. I will show that the combined effects of prohibition, privacy, and market institutions lead to a dominant strategy of indoor production that is relatively decentralized and somewhat small-scale. This complicates efforts to monitor and effectively regulate cannabis production.

*Cannabis sativa* is the plant from which the drug marijuana is harvested, and it is estimated that as much as 2,500 metric tons of it is grown in the United States each year (*National Drug Control Strategy* 2004, 30). The role of the cannabis producer is that of a highly specialized horticulturalist who must hide his or her activity from law enforcement agents. In this section, I explain the lifecycle of the plant, the responsibilities of the producer, and the efforts of law enforcement agents to detect outdoor and indoor grow operations. I focus on how transaction costs and individual behavior are affected throughout the production process by anti-cannabis legislation and drug enforcement. Later, I examine methamphetamine production and how it is also regulated. I end each of these case studies with conclusions in which I discuss qualitatively the effects of institutions on the drug’s producers, the transaction costs that result, and the behavior of manufacturers.

* Curiously, the 2004 estimate of 2,500 metric tons of domestically produced cannabis is much lower than the estimate of 10,000 metric tons reported in the 2003 *National Drug Control Strategy* despite a lack of evidence that production has actually decreased.
The drug marijuana comes from the flowering part of cannabis that buds once the plant has reached its final stage of development (Frank and Rosenthal 1978, 61). The cannabis plant itself is an annual that has four essential requisites for life: light, air, water, and soil. Each of these resources affects the growth and development of the plant in different ways. If these resources are unavailable or deficient, the plant may die or at least fail to produce usable amounts of marijuana (Frank and Rosenthal 1978, 52). The quality and quantity of the drug will also depend upon these factors. The compound Δ-9 tetrahydrocannabinol (THC), to which marijuana owes most of its psychoactive properties, is highly concentrated in the flowering part of the cannabis plant. “This [substance],” Frank and Rosenthal write, “is the main psychotomimetic (mindbending) ingredient of marijuana….It occurs in almost all cannabis in concentrations that vary from traces to about 95 percent of all the cannabinoids in the sample” (1978, 21).† The potency of the marijuana (the ratio of THC to the plant’s other organic matter) varies depending on the method of production chosen by the grower, or how light, air, soil, and water resources are used. In order to better understand how these resources are used by the producer, let us examine the lifecycle of the plant.

The lifecycle of the cannabis plant can be separated into five stages, which last a total of about four to nine months (Frank and Rosenthal 1978, 47-52). Germination is the first stage of cannabis development, and it takes about three to five days to complete. In the germination stage, the seed splits and grows a radical (or embryonic) root that moves down into the growing medium (typically soil) to gather nutrients. Meanwhile, a thin stem with two small oval-shaped leaves protrudes out of the growing medium. Next is the seedling stage. In this stage, the plant

† Cannabinoids are the psychoactive chemicals in the cannabis plant. “By 1975, 37 naturally occurring cannabinoids have been isolated, and more have since been discovered. Most of the cannabinoids appear in very small amounts (less than .01 percent of total cannabinoids) and are not considered psychoactive…." (Frank and Rosenthal 1978, 21).
sprouts increasing numbers of leaves: “Each new set of leaves will be larger, with a higher number of blades per leaf until, depending on [the plant] variety, they reach a maximum number, often nine or eleven. The seedling stage is completed within four to six weeks” (Frank and Rosenthal 1978, 49). The vegetative growth stage follows and generally lasts until the third to fifth month of the plant’s life. “With excellent growing conditions,” Frank and Rosenthal write, “cannabis has been known to grow six inches a day, although the rate is more commonly one to two inches” (1978, 49-50). The rate of growth will slow toward the end of this period, when the preflowering stage begins. The preflowering stage is a two-week period of repose in which the plant discontinues its vegetative growth and directs its energy to reproduction, or flowering.

Flowering, which takes about one to two months, is the final stage of cannabis development. In this stage, the cannabis plant produces flowers to be consumed as the drug marijuana and seeds to assure future generations. In order for flowering to take place, there must be a significant change in the photoperiod, or the duration of the plant’s exposure to light. To ensure flowering, the typical cannabis plant must have a photoperiod of at least eight to thirteen hours of complete darkness for every 24 hour day. This signals to the plant that the days are getting shorter, winter is coming, and it must now begin producing seeds. Frank and Rosenthal write, “Cannabis is dioecious: each plant produces either male or female flowers, and is considered either a male plant or a female plant. Male plants usually start to flower about one month before the female; however, there is sufficient overlap to ensure pollination” (1978, 50-51). Male cannabis plants die quickly after they release their pollen and are not generally harvested for marijuana. Female cannabis plants will continue to flower and produce seeds until growing stops and they begin to die. The females will also produce more potent marijuana if the male plants are removed as soon as they can be identified. However, if the producer wants to
have seeds for future generations of plants, then he or she must leave some males to pollinate female plants. Seeds may take ten days to five weeks to become viable after the female is pollinated. The job of a cannabis producer, whether an individual or nature, is to provide light, air, water, and soil to facilitate the plant in each of its stages of development. There is a vast amount of information available about this unique species of plant, but this will suffice to grasp a basic understanding of how cannabis growers operate.

Cannabis Production

Cannabis production can occur in a variety of ways. Cannabis producers can do as little as come across the plant in a natural setting—since it grows wildly in nature—or they can drop a few seeds on the ground and grow a usable quantity of marijuana in several months.‡ Other growers have been known to plant cannabis between rows of corn or far off in uninhabited locations. There are also individuals who elect to grow cannabis indoors, where they can control the environmental conditions. For the purposes of generalizing the wide variety of cannabis growing techniques they are commonly separated into two main categories: outdoor and indoor production. These two methods differ in how individual producers use resources. Outdoor cannabis growers depend upon natural resources and processes to nurture their crop; indoor growers provide necessary resources, so they can exercise some level of control over the development of their plants. Each of these methods yields the drug marijuana in different quantities and potencies, and they present different advantages and disadvantages for producers.

Outdoor cannabis production requires only the resources available in nature. To commence with outdoor cannabis growing, a producer selects an area of land that receives

‡ Most wild cannabis (wild hemp or ditchweed) is not suitable for consumption as the drug marijuana because it bears insignificant amounts of THC.
abundant sunlight, clean air, and plenty of rainfall. As Frank and Rosenthal write, “Marijuana is a sun plant. The plants will grow in partially shaded areas, but about five hours of direct sunlight daily are needed for development into a lush bush. Marijuana does best when it has direct sunlight all day. If it grows at all in a heavily shaded area it will be dwarfed and sparse....” (1978, 165). Some outdoor producers build greenhouses, some grow cannabis in their backyards, some plant their crop in pots, and still others utilize “guerilla” gardening techniques and plant their crop far away from their own property (Frank and Rosenthal 1978, 162-163). The scope of producer behavior for outdoor cannabis gardening is as broad as any legal type of outdoor gardening.

Cannabis is an annual plant, which in most cases sprouts in the spring and can be left alone until the fall. The climate where cannabis is planted has some effect on its development, too, but the plants are highly adaptable—both individually and as a genus. There are numerous strains of cannabis that have adapted to different climates all over the world, and they can grow with or without human assistance. The cannabis plant is “tenacious and hardy—a survivor among plants. It thrives in a variety of environmental conditions, whether 10,000 feet in the Himalayas, the tropical valleys of Columbia, or the cool and rainy New England coast” (Frank and Rosenthal 1978, 14). As a genus, “[Cannabis plants] have been so successful at adapting and harmonizing with new environments that they are now considered the most widely distributed of cultivated plants” (Frank and Rosenthal 1978, 14).

The effort exerted by the outdoor cannabis producer is minimal. The producer who undertakes outdoor production can do as little as plant viable cannabis seeds in a healthy environment (if nature has not already done so) and wait four to nine months for the plant to flower. At the end of the flowering stage, which occurs once annually in the fall, the producer
harvests the flowers of the plant. Seeds left in the soil will generally outlast freezing winter weather and germinate next spring. The rest of the cannabis plant may contain THC, but it does not typically constitute the drug marijuana. The amount and potency of the marijuana produced in this manner depends on the quality of the air, water, and soil in which the plant grows, and the amount of sunlight the plant receives. It is possible for a producer to improve these conditions for outdoor growing by, for example, fertilizing the ground, adjusting the pH level of the soil, installing sprinklers to water the plants, planting seeds in pots instead of in the ground, and covering the plants to protect them from frost. But cannabis varieties that are indigenous to a particular climate can flourish with little or no human interference. This suggests that the resource requirements for outdoor cannabis production are inexpensive and abundant—with the exception of land—and that outdoor growing is relatively simple.

Growing cannabis indoors requires considerably more resources and effort. The indoor method requires a producer to provide and control necessary resources for the plant to grow in a simulated natural setting. Indoor grow operations vary in size and complexity from a single plant in a closet or near a window to numerous plants supported by a vast automated infrastructure of lighting, aeration, and hydration. Some indoor cannabis producers use mirrors, skylights, or windows to provide natural sunlight, while others use artificial lighting. Some producers grow their cannabis in well-ventilated areas, and others use complex air-filtration devices. Some grow their plants in soil and water them every 10 days or so, while others use hydroponics (growing plants without soil) and a network of pipes and hoses to provide water and nutrients to the plants (Rosenthal 1986, 27-34). It is up to the cannabis producer how he or she provides essential resources. The ability and skill of the producer to provide these resources will determine the quantity and quality of marijuana produced.
The size of the crop for the indoor producer will depend upon the number of plants the space allows, the size of the containers in which the plants grow, the air quality, the frequency and amount of watering, the nutrient content of the soil or growing media, and most importantly, the light. If all other resources are well-supplied throughout the plant’s development, light is the factor that determines when the plant will begin its flowering stage. As Frank and Rosenthal state, “A flowering hormone is present during all stages of growth. This hormone is sensitive to light and is rendered inactive by even low levels of light. When the lengths of dark periods are long enough, the hormones increase to a critical level that triggers the reproductive cycle. Vegetative growth ends and flowering begins” (Frank and Rosenthal 1978, 54). Light can also be used to delay flowering: “By preventing long nights, using artificial light to interrupt the dark period, you can force the plants to continue vegetative growth...The amount of light needed to prevent flowering is quite small (about .03 foot candles—on a clear night the full moon is about .01 foot candles)” (Frank and Rosenthal 1978, 55-58). When a plant has reached maturity and the producer is ready to harvest the marijuana, he or she merely reduces the length of the plant’s exposure to light to 13 hours or less and waits one to two months for the flowering stage to complete. Rosenthal also suggests that, “the amount of light [supplied by the producer] and the length of the tube determine the size of the garden. Marijuana will grow with as little as 10 watts per square foot of growing area, but the more light [the producer gives] the plants, the faster and larger they will grow” (Frank and Rosenthal 1978, 75-76). It is also possible that the cannabis grower can install mirrors or reflective material to use artificial light more efficiently. Toward 50 watts per square foot, the authors suggest that diminishing returns are reached. They add that with 40 watts per square foot, “…the growth is incredible. More than one grower has said they
can hear the plants growing—the leaves rustle as growth changes their position” (Frank and Rosenthal 1978, 77).

By coaxing these natural processes, the indoor producer has some influence over the size of the crop, the ratio of THC to plant matter, and the duration of the growing season. The greatest advantage of indoor growing is that the producer has control over the flowering stage of the plant’s lifecycle. While the outdoor cannabis plant will only produce flowers once the shorter days of the fall season arrive, the indoor cannabis producer can completely control the photoperiod. He or she is limited with regard to the amount of space available for indoor gardening, but conversely, indoor growing can yield continuous amounts of high-potency marijuana. In other words, the indoor producer can have a crop of cannabis in which some number of plants is continuously flowering and thus continuously producing marijuana. Continuous growth systems are similar to the crop rotation systems used by the agriculture industry. The cannabis producer who operates a continuous growth system has plants in three or four different stages of life, which he or she rotates out after each bunch reaches the flowering stage to make room for a new crop (Frank and Rosenthal 1978, 60).

These two major cannabis production techniques can best be summarized as follows: Outdoor cannabis growing requires little or no effort on behalf of the producer. Because cannabis is a hearty plant that has adapted itself to numerous climates, it can thrive independently of human interaction in many different environments. Outdoor cannabis production requires land that is suitable for vegetation, fresh air and water, and plenty of sunlight. Once a year the outdoor producer can harvest his or her flowering plants for their marijuana and leave seeds on the ground to begin a new crop in the next growing season. The potency of the marijuana produced
outdoors will vary depending on the characteristics of a particular growing season and the environment in which it grows.

Indoor cannabis growing can occur with little effort, as is the case with an individual who plants cannabis in a pot near a window. It can also be an expensive enterprise, with much equipment and effort going into cultivating large cannabis plants that are rich in THC. The range of indoor cannabis production depends upon the skill levels of the gardener and his or her investments of time and resources. Some gardeners are content with utilizing small indoor grow operations to provide a self-sustainable quantity of marijuana once annually. Other indoor cannabis producers invest thousands of dollars to build nurseries that can supply hundreds of pounds of high-potency marijuana year-round. Outdoor growers have an advantage in the amount of cultivatable land, but they can be difficult to hide. Rosenthal explains, “It is usually better to grow the plants outdoors if possible, because the plants can grow much larger and faster than indoors. Indoors presents space and light limitations…” (Rosenthal and Frank 1978, 70). He continues, “On the other hand, outdoor plants are more likely to be seen. Many gardens get ripped off, and busts are a constant threat. Indoor gardens are much less likely to be discovered” (Rosenthal and Frank 1978, 70). In order to understand which method a cannabis producer is likely to choose I now turn to the institutions of cannabis prohibition, privacy rights, and the cannabis market.

The Institutions of Prohibition, Privacy, and Drug Markets

In the previous chapter, I discussed the works of North and Thomas, North and Weingast, and Firmin-Sellers, to demonstrate two fundamental principles of institutional analysis: (1) Institutions affect transaction costs, which in turn shape individual behavior; and (2) institutions
often overlap in a way that presents both intended and unintended consequences. In this section I will return to both of these principles as I explicate the three main sets of overlapping institutional arrangements that affect cannabis manufacturers: drug policy and enforcement mechanisms, privacy laws, and market characteristics. I begin with legislation and enforcement, whose institutional arrangements create risk for the producer. Second, I show that the right to privacy, by restricting law enforcement jurisdiction, protects cannabis manufacturers to some extent. Then, I discuss the institutions of the cannabis market in which individuals can produce cannabis for their own use or for remuneration. I insert comments from interviewees where appropriate.

**Drug Policy and Enforcement**

Because I am discussing the production of cannabis, it is clear that one set of institutional arrangements is comprised of the laws and enforcement mechanisms that prohibit illicit drug activity. These laws and enforcement practices aim to stop the proliferation of the cannabis plant and the drug marijuana by penalizing producers, distributors, and consumers. Here again, we are only concerned with producers because they are the source of domestically grown cannabis. The formal institutions of cannabis prohibition are specified by federal and state legislation, and they are enforced by many government agencies. Cannabis is prohibited by the United States government in the Controlled Substances Act (CSA) (US CSA 1970, Title 21, Chapter 13).\(^8\) Under the CSA, the Drug Enforcement Administration (DEA) determines which drugs are controlled substances, and the Food and Drug Administration (FDA) decides which drugs may

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\(^8\) Actually this has changed many times. Cannabis has been criminalized under the Uniform State Narcotic Act (1932), the Marijuana Tax Act (1937), the Boggs Act (1952), and the Narcotics Control Act (1956). The Controlled Substances Act of 1970 is actually Title II of the Comprehensive Drug Abuse Prevention and Control Act (Bonnie and Whitebread 1970).
be obtained with a physician’s prescription. States can specify their own provisions, but they cannot limit the CSA.

The CSA classifies narcotic drugs within five different categories called schedules. Cannabis is classified as a Schedule I drug, along with LSD, MDMA, peyote, heroin, and many others. These drugs are considered by the Federal Government to have a high potential for abuse, no known medicinal benefits, and a lack of safety even under close medical supervision. Drugs that do have an accepted medicinal use but can also be addictive are classified as Schedule II. Widely used drugs in this category include methamphetamine, cocaine, opium, and morphine. Schedule III drugs have even less of a potential for abuse, and examples include Ketamine and various steroids. Schedule IV drugs are considered to have a lower potential for abuse than Schedules II and III, and many of them are pharmaceuticals: Xanax®, Valium®, and Rohypnol®. Schedule V drugs are considered to have the least potential for abuse in comparison to the previous schedules. They are currently accepted for medicinal use, and they have a low potential for physical and psychological dependence (US CSA 1970; Erowid 2004; ImpacTeen 2002).

One of the many aims of the CSA is to assign degrees of criminality to different types of drugs. The penalties, specified differently by states and the federal government, assign the potential punishments that individuals can receive if they are caught growing cannabis. If a producer is not caught, then the penalty is not realized. The results are two main components of risk that cannabis growers face: the penalty dictated within the text of the law and the probability of actually being monitored by law enforcement agents. Let us examine these two components of risk separately.

* Upjohn Company
† Hoffmann-La Roche, Inc.
The penalties specified by drug laws make up the first component of risk. Federal and state laws ban the production of cannabis, and they vary substantially across penalties, quantities, and degrees of criminality. Federal law prohibits sale or cultivation of up to 50 kilograms of cannabis with a punishment not to exceed five years in prison and a $250,000 fine. For 50 to 100 kilograms, the punishment increases up to 20 years in prison and a $1,000,000 fine. For 100 to 1,000 kilograms, the punishment is 5 to 40 years in prison and a $4,000,000 fine. Over 1,000 kilograms, the punishment can be as high as life imprisonment and a $4,000,000 fine. All of these penalties are doubled if the act occurs within 1,000 feet of a school or other specified area.

State penalties vary across quantity measurements for the crime, time served in jail, monetary fine amount, and whether the crime constitutes a misdemeanor or a felony. Many state laws also vary by whether they punish the sale and production of cannabis separately. In Alabama, for instance, cultivating up to 2.2 pounds of cannabis is a felony punishable by a three-year mandatory minimum sentence and a $25,000 fine. In Idaho, selling or cultivating up to one pound or 24 plants is a felony punishable by a five-year sentence and a $15,000 fine. Selling or cultivating up to one ounce in Alaska can be punished by one year in prison and a $5,000 fine, but in California growing any amount of cannabis is a felony punishable by up to 16 months in prison and no monetary fine—patients and caregivers are exempt. Most drug offenders, including cannabis producers, are punished by state laws. Cannabis-related crimes of extremely large quantities, violent and career offenses, or those that go beyond state borders are reserved for federal courts. Here, a criminal defense attorney, who has represented many drug offenders, explains cannabis legislation in Texas:

If it is not delivery and it is just possession for your own personal use, which 20 or 30 plants can be, because you are just growing it for yourself, probation is mandatory in Texas…and the punishment is not by plants, it is by weight. It depends on the weight of the usable quantity of marijuana. What [police] usually
do is seize the plants, shake off the dirt, and weigh the marijuana…They usually do not set a tare for the stalks or the seeds or the twigs or anything like that.

The punishment an individual faces varies depending on where he or she grows cannabis, how much is grown, and whether it is intended for distribution. As the attorney explains, the penalties for producing cannabis can be very low (probation) if there is no evidence of distribution. With greater quantities of production or the additional evidence of distribution, cannabis related penalties can be immense.

The second main component of risk is the probability of actually being monitored and sanctioned. Figure 1.1 shows the total number of arrests for cannabis, and Figure 1.2 shows the quantity of cannabis seized, both compared to other drugs. (All figures are located in the Appendix.) These figures represent the number of individuals being monitored and sanctioned by law enforcement agents and the quantity of drugs these agents confiscate. As I mentioned above, federal and state laws seek to increase risk for cannabis producers by promising fines and jail time. Unfortunately, there is no definitive way to measure the probability that these agents monitor and sanction manufacturers because there is no way of accurately determining the number of producers who go undetected. A police sergeant and narcotics task force agent explains how cannabis producers typically get caught:

Generally, they will get caught because—a lot of the ones we see are in apartments and things like that where the management may enter that person’s apartment for routine maintenance and come across what they believe is a marijuana grow and they contact us and we generally catch the person at that point. If we are investigating someone, it may be a high electric bill or something like that. If it is a house or an apartment, and everyone else’s electric bill may be $80-100, where this one is $300, the reason is all of the grow equipment that is necessary for all of that…The electric company, if their meter reader notices something peculiar they may contact us and let us know that something doesn’t seem right. But a lot of times, if we have a house that is under suspicion we may contact the electric provider with a Grand Jury subpoena or something to figure out what their bill is. And it just adds to what we are suspecting.
Law enforcement agents use tactics like this to extract information from inside an individual’s zone of privacy. Cannabis growers may use generators, mirrors, or greenhouses to maintain normal electric bills and divert the attention of utility companies. These evasive tactics discourage risk by reducing the possibility of signaling law enforcement agents.

Similar law enforcement efforts take place at the local, state, federal, and regional (or taskforce) level. At each of these levels, agents are focusing on different corners of illicit drug markets. The same police sergeant explains how law enforcement agencies work together to increase their monitoring and sanctioning coverage:

With the taskforces throughout the state that are working, basically, just on drug investigations, there is a lot more agency cooperation than there used to be. It used to be if we had someone in Lewisville and they were telling us about someone in Carrollton, you know, that is Carrollton. But now, we contact Carrollton and pass the information along. Or we will go to Carrollton ourselves and see what we can do. That, and the fact that the federal agencies have created the [High Intensity Drug Trafficking Area] taskforces…There are several regions in the United States that are designated as High Intensity Drug Trafficking Areas, and the Dallas area is one of those. So in the Dallas area we have actually got FBI agents that are investigating drug offenses…So there are a lot more people concentrating on drug investigations than there has been in the past…It works out real well, if we get what we think is a large-scale investigation we will contact either the state police or the federal agencies and get them involved. We just kind of all work together for a common goal.

Shipping drugs across jurisdictions requires law enforcement agents to traverse other state and local police departments. Regional taskforces, although they may employ police officers from state and local agencies, often supersede borders with the goal of intercepting and tracking long-range drug shipments. The targets vary from large-scale domestic growers to distributors and importers. It may seem that many law enforcement agents are constantly working to monitor and sanction cannabis manufacturers, but most of their efforts are on the transshipment of drugs across federal and state borders. As the sergeant continues, “The marijuana growers, we really
don’t deal with them that much and if we do it is small in scale. If we have something more important to do, then it is up there on the list.” This seems to imply that some law enforcement agencies assign a low priority to monitoring and sanctioning cannabis manufacturers, which may lead to decreased risk for evading prohibition.

The intended result of the institutional arrangements of cannabis prohibition is for individuals not to produce cannabis. For many people, the threats of jail time and fines are discouragement enough from engaging in cannabis production, and this is evident in the majority of the population that does not grow cannabis. For those who do grow cannabis, prohibitionist laws do not have the same effect. Instead, the penalties and probability of being monitored and sanctioned by law enforcement agents combine to create risk, which individuals can perceive via a network of cannabis market participants, media, and personal experiences.

In the National Center for State Courts’ *Caseload Highlights*, Brian Ostrom and Neal B. Kauder state, “Increases in drug arrests, like arrests for prostitution and gambling, can occur by allocating more law enforcement resources to investigate and apprehend persons engaged in such activities. An increase in drug arrest rates also may reflect a rise in drug use, a change in the way drugs are marketed and sold, or a shift in public attitudes toward further reducing drug-related crime” (1999, 2). Here, however, we are concerned with how arrests affect producers, such as by increasing the perception of risk. Figure 1.3 shows that estimates of consumption follow the trend in arrest data for possession of cannabis. This suggests that law enforcement agents are largely arresting individuals on the demand side of the cannabis market (i.e., possession crimes) as demand increases. Ostrom and Kauder continue, “…drug arrest data—the number of accused drug offenders who have been detected and apprehended—do not measure all illegal drug activity. For this reason, using drug arrest data to measure overall drug activity tends to be more
speculative than using victimization or reported offense data for estimating other criminal activity” (1999, 2). Although arrest data cannot be used as an accurate measure of illegal drug activity, one can use this data as a measurement of law enforcement activity, and consequently, as an indirect estimate of the probability of being monitored and sanctioned. It is likely that what the cannabis manufacturer sees is a market with increasing arrests and demand, while arrests for sale and production remain relatively constant.

Although we cannot directly measure the probability of being monitored and sanctioned by law enforcement agents directly, we can examine the arrests for selling and manufacturing cannabis relative to simple possession. Figure 1.4 shows arrests for cannabis as a percentage of all drug arrests, separated by the activities of sale/manufacture and possession. Here, the percentage of arrests for manufacture and sales of cannabis remain relatively constant throughout the period from 1982 to 2003, while the arrests for possession change substantially. The disproportionate changes in arrests for possession relative to the arrests for sale and manufacture imply that law enforcement agents have varying abilities to monitor and sanction these different market roles. This is illustrated by annual percentages of producer and distributor arrests that remain relatively constant at 10% or lower from 1982 to 2002, while arrests for possession range from approximately 25% to 60% of all drug arrests during these two decades. These data may suggest that fewer manufacturers are subject to monitoring and sanctioning by law enforcement agents, which could be an indication of the success of manufacturers to effectively hide their behavior.

These are not enough data to draw definitive conclusions about how the risks of detection differ among market roles, but there are some speculations that can be made. One reason for this gap in the number of arrests may be that law enforcement agents are limited in their ability to
monitor and sanction producers and distributors compared to consumers. In other words, many producers might supply much of the domestic cannabis without alerting law enforcement agents. Another possible explanation is that the number of producers and distributors in the market remains relatively constant while the volume of production changes. This explanation means that producers are increasing their per capita production without adding more producers to the market. Another scenario is that consumers are relying on imported rather than domestically produced cannabis, suggesting that producers and/or distributors are abandoning domestic growing for imports—most likely from Mexico and Canada. Realistically, it is probably the case that all three of these scenarios are taking place, but it is difficult to state with confidence the degree to which each occurs. While all three scenarios present interesting research questions, the problem of interest in this essay is that of producer behavior. For this reason, I will continue to focus on how domestic producers evade law enforcement agents, but I will not discuss strategies of cannabis importation.

In short, the primary aspect of cannabis prohibition is a formal statement restricting individuals from growing cannabis. For most individuals, the law itself is sufficient to prohibit them from growing the plant. Some individuals do not adhere to this aim, and they are subject to monitoring and sanctioning by the institution’s enforcement mechanism—law enforcement agents and the courts. The penalties described within the legislation, combined with the probability of being detected by law enforcement agents, create risk for cannabis manufacturers. However, producers can minimize this risk to some extent. In order to examine how producers go about minimizing risk, let us now turn to the right to privacy.

** This does not suggest that cannabis importation is not a significant part of the cannabis market in the United States. As an article in *The Police Chief*, by John T. Peoples and Larry M. Hahn, explains, “It is currently estimated that 25 percent of cannabis consumed in the United States is produced domestically; it is anticipated that by 1995, 50 percent of the marijuana consumed in this country will be grown here” (1991, 119).
The Right to Privacy

The second institution of concern for cannabis manufacturers is the individual’s right to privacy. It is this institutional arrangement that limits law enforcement agents’ abilities to arrest manufacturers and eradicate indoor cannabis. The right to privacy, that which protects individuals from unlawful searches and seizures, is a penumbral right granted essentially by the Fourth, Fifth, and Ninth Amendments of the Constitution and reinforced by subsequent case law. For cannabis manufacturers, we are concerned primarily with the Fourth Amendment of the Constitution because it creates a zone of privacy in which cannabis manufacturing can occur. The Fourth Amendment states, “The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, and no Warrants shall issue, but upon probable cause, supported by Oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized.” As an institutional arrangement, the Fourth Amendment protects individuals from intrusion into their private property by law enforcement or other government agencies. The result is that law enforcement agents must show probable cause or reasonable suspicion that an illegal activity is taking place in order to be granted a warrant to search an individual’s private property.

More specifically, for a judge to issue a search warrant, police must show that it is likely that a crime is or was occurring and that evidence related to the crime is likely to be discovered on an individual’s property. There are exceptions and additions to this rule that are enumerated in a series of case law stemming from the 1969 case of Spinelli v. United States (393 U.S. 410; 89 S. Ct. 584). Most case law involving an individual’s right to privacy relates to his or her physical
person and personal or medical information. But in the case of illicit drug manufacturing, we are primarily concerned with search and seizure practices that relate to physical space, such as an individual’s home.

The space within an individual’s home is an extremely private area. Small grow operations can fit in sheds or closets. As the attorney I introduced earlier explains,

They basically just share it with a very, very small circle of friends, if they do it at all, and basically a lot of them smoke at home and they aren’t stupid about it. They don’t smoke in the car, where they are subject to traffic stops. They don’t smoke on the street. The ones who get caught, usually, most of them get caught with traffic stops.

Cannabis growing does not require the producer to take goods in and out of a home, which can make it difficult for law enforcement agents to collect information about the activity. A narcotics task force officer, with much experience monitoring and sanctioning drug offenders, adds,

They have every right that the Fourth Amendment gives them. We have to play by Fourth Amendment rules, by civil law, by criminal law. We have to play by the rule book and whatever the rules are laid out to us. That is the only way we can attack them and if you violate those rules, then essentially that gets them thrown out of court and they walk free. So, if you don’t play by the rules then you are just going to lose the case.

These institutional arrangements severely limit the abilities of law enforcement agents to monitor cannabis producers.

Because of the right to privacy individuals can evade law enforcement agents within their homes and other indoor locations as long as they do not leak information about the operation outside of their zone of privacy. The institutions of privacy affect cannabis producers by offering them an alternative to outdoor production that is somewhat protected from law enforcement efforts. As mentioned above, cannabis producers can use the indoor growing method, which can be contained in a more controlled private location such as an apartment, house, or warehouse. Finding enough information to obtain a warrant depends upon the production method chosen by
the cannabis grower. Outdoor producers have the advantage of a vast amount of space (perhaps hidden by trees or tall brush), which lowers the probability that law enforcement will find a crop of cannabis. Indoor producers have the advantage of added privacy. Both the indoor and outdoor production methods can limit the efforts of law enforcement agents to monitor and sanction cannabis growing, if a grower is working to minimize risk. Consequently, law enforcement is not perfect because agents cannot monitor and sanction all possible cannabis growing locations at all times.

For many producers it is more feasible to grow cannabis indoors, where this behavior can be hidden most effectively. As one author explains,

Commercial marijuana growers are increasingly moving their crop indoors, using artificial light and hydroponics, to avoid theft, reduce the risk of detection, control the growing process, and profit from up to six harvests a year. Thirty mature plants can easily be grown in an area the size of a bathtub…Often a false wall hides a grow room in a house, or the foundation of a house doesn’t match its basement, which seems oddly smaller, or there are second stories with no stairwells, or crawl spaces hidden beneath floors…Nowadays growers rent storage units and apartments, using phony names and paying in cash, and build small grow operations at different locations, with timing devices and automatic controls. The authorities may find one or two—a loss anticipated in the grower’s business plan—without being able to trace ownership. (Schlosser 2003, 36-37).

Outdoor cultivation can occur in sparsely populated areas because space is ample, and local law enforcement agencies have a large amount of territory to monitor with a small number of officers. As a result, local law enforcement agents might have difficulty locating and sanctioning growers, having to cooperate occasionally with other state and federal agencies to increase monitoring and sanctioning coverage. Some law enforcement agencies also use planes and helicopters to monitor cannabis growers from the air, but this is an expensive tactic with unpredictable results. Outdoor cannabis production implies a degree of exposure to potential law enforcement agents, but this can be minimized in lowly populated areas.
Right-to-privacy institutions are by no means a guaranteed tool for minimizing risk, and to some extent, cannabis manufacturers are limited by their own creativity and resources in solving the problem of risk minimization. However, with enough effort, the right to privacy is enough to protect an indoor producer from searches and seizures if evidence of cannabis production can be kept to a minimum. Of course, low-quantity cannabis production is fairly easy for an individual to hide because it takes up little space, and larger quantities require more space and effort in order to maintain secrecy. This simple spatial constraint suggests that the total cost of risk for the production of cannabis increases with the size of the crop and that large scale producers will tend to be less common. As a result, if individuals produce cannabis indoors, they are likely to grow a moderate enough quantity as to protect their privacy, while producing enough for their own consumption, to earn a profit, or both.

The most significant aspect of privacy rights for cannabis manufacturers is that law enforcement agents do not have to obtain a warrant if they can see the plants growing on an individual’s property, if they can see evidence of the production, or if they have evidence that a drug deal is about to take place. This means that there is no reasonable expectation of privacy for outdoor cannabis producers because their activity occurs in view of aerial law enforcement efforts, neighbors, or perhaps even law enforcement agents patrolling the streets. In the case of rural production, this may be trivial because of sparse law enforcement coverage, but law enforcement efforts are increasing the risk of detection for this type of activity with aerial searches and other tactics.

Indoor producers, on the other hand, do have protection against search and seizures insofar as they can carefully restrict and withhold the evidence of their activity from law enforcement agents. In the case of low-quantity production this may be fairly simple because, as
mentioned previously, as many as thirty plants can be hidden in a space the size of a bathtub. In other cases, however, large scale cannabis producers must deal with the high electricity bills, the intense heat, the fires, the flooding, and especially the strong smell of cannabis that can potentially alert law enforcement agents directly or indirectly through neighbors or passersby. Thus, it seems plausible that the amount of effort and resources that an indoor producer devotes to hiding his or her activity will lower the risk (transaction costs) of production, as long as he or she is also optimizing output with respect to risk instead of merely maximizing output. This may consequently increase the costs of inputs and thus the total production costs, but over time the risk minimizing strategy pays off because the producer decreases the probability of spending time in jail or paying fines.

Whether an individual produces cannabis outdoors or indoors reflects his or her perceptions of risk and how to avoid detection. The right to privacy is not always sufficient to evade law enforcement agents, as we have seen by the relatively constant number of producer/manufacturer arrests, but it is likely to be effective enough to work some of the time. The individual’s ability to contain information about his or her cannabis production, then, is an unintended consequence of the institutional arrangements of personal privacy as they overlap those of prohibition. As long as some individuals are able to circumvent the institutions of cannabis prohibition there is enough of the commodity to comprise a market, which I will now discuss.

The Cannabis Market

Because risk increases transaction cost, and because cannabis manufacturers are economic actors, we must now look at the institutions of cannabis markets in order to further
understand manufacturers’ strategic behavior. I have already discussed the nature of cannabis production, which can be separated into the outdoor and indoor growing methods. Both of these methods reflect different uses of land, labor, and capital; in addition, they present different benefits and costs to producers who, due to resource limitations and risk, may be more likely to resort to one method over the other.

The market for cannabis, just as any other drug market, resides in the economic realm known as the shadow economy. The shadow economy is a market system that is similar to the mainstream economy with the exception that shadow-economic transactions are primarily cash-based. Here, actors do not report their transactions to government agencies because it would most likely result in an arrest. In order to get a clearer picture of what actually transpires in cannabis markets, let us briefly define the market roles of individuals as manufacturer, distributor, and consumer. The role of the manufacturer, as mentioned earlier, is to bring cannabis into existence, which can be as simple as obtaining seeds and planting them in a discrete location; or with adequate resources he or she can resort to indoor growing. Once the cannabis is mature, the producer harvests, cures, and prepares the plant for distribution. Depending on the quantity grown, the producer can keep some for personal use and/or sell some to distributors or end-of-the-line consumers. The producer can serve as all three market roles, or he or she may only perform one or two of these roles.

The cannabis market presents a financial incentive to producers, and depending on the quantity of cannabis an individual is willing to grow, this incentive may be substantial. In order to be profitable, however, the benefits must outweigh the disincentive presented by the prohibitionist institutions, including the costs of covering up the behavior. The costs in terms of time, effort, and money of hiding the behavior compound the fines, jail time, and likelihood of
being caught, which contribute to total production costs. Douglass North writes, “The total costs of production consist of the resource inputs of land, labor, and capital involved both in transforming the physical attributes of a good (size, weight, color, location, chemical composition, and so forth) and in transacting—defining, protecting, and enforcing the property rights to goods (the right to use, the right to derive income from the use of, the right to exclude, and the right to exchange)” (1990, 28). The resource costs of production for a cannabis manufacturer are minimal because the activity is one of cottage industry. This suggests that like the small cottage farms that were prominent before the industrial revolution, cannabis manufacturers do not need to allocate resources from an external source in order to undertake production. That is, outdoor cannabis manufacturers have everything they need to produce their crop without having to purchase equipment or other resources from businesses or individuals. The seeds used for production are one exception to this, but as we know from cannabis botany, the part of the plant that is consumed as the drug marijuana is the same part of the plant that produces seeds. Obtaining seeds, then, is no more difficult for the cannabis manufacturer than it is for the lowest quantity consumer. The other resources a cannabis manufacturer might require, such as light, air, water, and soil, can be obtained by merely planting the seeds outdoors or, if the manufacturer chooses, by lamps, hoses, and indoor plumbing. For instance, “special fertilizers, plant hormones and steroids, carbon dioxide and advanced horticultural techniques are all used by the informed illegal grower to ‘push’ the plant into producing the highest-grade, most potent [marijuana]” (Peoples and Hahn 1991), but the uninformed grower can still produce a substantial yield for a generous profit.

Although the resource costs for cannabis producers can be low, the total costs of production, which include resource and transaction costs, are potentially high if the producer
does not make an effort to reduce risk. Since cannabis is an illegal commodity, the producer has no property rights that protect his or her investment. The cannabis manufacturer, for instance, cannot upon being monitored and sanctioned by law enforcement agents continue to reap the benefits of his or her investment. In fact, it is likely that the producer will serve jail time and face fines and asset forfeitures, which multiplies the loss of product he or she faces if monitored and sanctioned by law enforcement agents. Cannabis manufacturers have only one option available to protect the property rights to the illegal goods they produce—hide the activity.

In order to answer the question of how the prohibitionist institutions of cannabis affect manufacturers, we must look at what risk minimizing strategies individuals are likely to adopt to avoid these institutions. Cannabis cultivation is an illegal activity, and it must occur out of the view of law enforcement agents and other concerned citizens. In places where space is vast, a level of secrecy may be achieved by outdoor growing—perhaps by distance, brush, or trees. But where outdoor space is not readily available, or where individuals’ privacy is compromised outside, they are likely to move production indoors. There are tools that law enforcement agents can exploit to detect indoor cannabis growing, but they are imperfect and costly. For instance, “The DEA now employs thermal imaging devices, mounted on helicopters and low-flying airplanes, to detect abnormal heat sources that may indicate the presence of an indoor growing operation—or a pottery kiln, or a Jacuzzi. What is found depends on the skill of the technician” (Schlosser 2003, 37). Likewise, what is found also depends upon the manufacturer’s skill at hiding his or her behavior. Thick walls and other strategies are often employed to evade law enforcement technology. If nothing else, at least a single plant can be grown indoors near a small window that can be hidden by a tall fence. These tactics minimize the probability of being
monitored and sanctioned for producing cannabis. Without exceptional decreases in personal privacy, law enforcement agents cannot perfectly enforce cannabis prohibition.

Eradication statistics are one measure of law enforcement activity that provides insight into the risks of cannabis production. Figure 1.5 shows cannabis eradication statistics separated by outdoor and indoor growing from 1991 to 2001. The graph shows that more outdoor than indoor cannabis is eradicated by law enforcement agents. Throughout these two decades outdoor cannabis eradications varied and decreased on average, while indoor cannabis eradication remained consistently low. Given the unknown number of producers actively working in a market, it is uncertain if these data reflect the limitations law enforcement agents face in monitoring and sanctioning indoor growing or if the wide discrepancy in eradication data is due to fewer producers choosing the indoor growing method. A law enforcement agent adds, “In Lewisville, I would say, probably 95% is grown indoors. There is just nowhere to really grow it outdoors. If you get in more of a suburban environment, a small town out in the country where they have got fields or property, then yes, it could be grown outside more than here” (2004). Indoor eradication remains low and fairly constant, which seems to imply that varying law enforcement efforts can substantially affect outdoor producers but only marginally affect indoor producers.

Individuals who grow cannabis can minimize risk not only by growing cannabis indoors instead of outdoors, but also by creating small- to medium-scale grow operations. The reason for this is that law enforcement agents have more evidence of production and a greater opportunity to assess probable cause for a search when producers attempt to grow large quantities. Peoples and Hahn state, “Sinsemilla presently averages $2,500 to $3,500 per pound at the wholesale
level.†† Thus, with an investment of several thousand dollars in hydroponic equipment, a grower can produce 100 mature plants in four months and potentially realize a quarter-million-dollar crop of sinsemilla. Hundreds of plants can easily be grown inside the average residence” (1991, 120). The cost of producing cannabis indoors is mainly driven by the costs of inputs, including equipment, labor, and the property in which it is grown. Conversely, the costs of outdoor production are affected mainly by the manner in which individuals hides their activities, which is likely to be an inexpensive combination of labor and maybe some material resources.

Cannabis manufacturers, as entrepreneurs, are motivated by the profits they can earn by producing and selling cannabis, and this is clear if we again consider transaction costs. As I have already discussed, the total costs of cannabis production include resources and transaction costs. Resource costs for cannabis producers can be extremely low (cottage industry production), but transaction costs depend on the penalty specified in the law and the efforts of law enforcement agents monitoring and sanctioning the activity. In order for cannabis producers to profit from the activity, they must minimize risk to a point that makes producing and selling cannabis seem like a profitable endeavor. Law enforcement agents attempt to increase this cost of risk by maintaining a presence, eradicating plots, and arresting cannabis manufacturers. If this is truly a successful tactic, and by that I mean if monitoring and sanctioning efforts are indeed capable of increasing risk to the point of making cannabis production seem unprofitable (i.e., too risky), then it would be expected that the wholesale prices of cannabis reflect increasing risk for producers due to increasing arrests and eradication.

As we can see in Figure 1.6, however, this is not the case. Wholesale prices of cannabis actually decrease over the short period from 1997 to 2001 (data from 1998 is not yet available) despite the increases in arrests for manufacture and eradication that occur during this time. One

†† Sinsemilla is an alternative term for high-quality, indoor-grown, hydroponic cannabis.
explanation for decreasing wholesale prices is that total costs of production are also decreasing. Another explanation for decreasing wholesale price is that cannabis is a horticultural commodity, so resource and physical production costs for cannabis are fairly static. Thus, the decrease in the wholesale price of cannabis is attributable to decreasing transaction costs on the production level—either risk minimization, decreasing law enforcement efforts, or both. Wholesale prices can also decrease because of an increased supply of cannabis in the market due either to imports or increasing numbers of producers going undetected by law enforcement agents.

On the demand side of the market, we find a sharp increase in the retail price of cannabis in 2001 from $10.20 to $66.00 per gram. This is interesting because we would generally expect that wholesale and retail prices change together. Instead, we see a substantial markup in retail prices and a decline in wholesale prices, which creates an incentive for distributors to purchase from growers and sell to consumers. A police sergeant and narcotics officer explains cannabis prohibition in his jurisdiction: “I don’t think we have that many grow-houses around the area. We do experience them every now and again. The ones that I have seen have been small in nature and usually it is someone who is growing basically their own marijuana for their own use. The ones who are selling it and distributing it usually have a supplier and that is where they get their marijuana.” Such decreases in wholesale price coupled with increased retail price may actually serve to stimulate retail sales.

Increased retail prices can be caused by a number of economic variables—increased wholesale price, demand, and competition—but perhaps the simplest explanation is retailer profiteering: taking advantage of the perception of scarcity in order to charge higher prices. Figure 1.7 shows the eradication of outdoor and indoor cannabis with the addition of wild hemp. Most wild hemp is unfit for consumption as the drug marijuana because it bears extremely low
quantities of THC to organic plant matter, and it would not typically be sold in the cannabis
market. This type of feral cannabis is an industrial agricultural commodity that is rich in oil and
strong fibers. Its spread across the United States is largely the result of expired government
initiatives to produce cannabis for rope, canvas, and other industrial products that have since
been replaced by petroleum-based goods. Interestingly, the Domestic Cannabis
Eradication/Suppression Program (DCESP), which is responsible for the widespread eradication
of cannabis on behalf of the DEA, has been eradicating extremely large quantities of feral
cannabis in addition to its psychoactive cousin. Because of the publicity of the DEA’s
eradication efforts it may actually be the case that the perception of limited supply has indirectly
cau sed the steep increase in price illustrated by Figure 1.6. The reason for this is that the
combination of unusable hemp with more usable strains of marijuana contaminates government
statistics, potentially causing an inflated perception of scarcity. Historical data on wholesale and
retail prices of cannabis would be very helpful in this case to compare to eradication, but
unfortunately reliable data only reach as far back as 1997. By raising the perception of risk,
prohibition institutions possibly increase transaction costs, but if enforcement does not match
this perception, then prohibition only succeeds in raising prices, and consequently, profits for
producers and distributors.

There are many conclusions that can be drawn from an examination of cannabis market
institutions, but four, in particular, stand out. First, arrests for cannabis occur mostly for
possession rather than manufacture or sale, which in market terms means that consumers are
punished more than producers or manufacturers. Second, eradication of usable cannabis varies
greatly outdoors while indoor eradication remains consistently low. This implies that for those
producers who are monitored and sanctioned, indoor producers are monitored and sanctioned
less than outdoor producers. Third, retail prices increase while wholesale prices remain consistently low, creating an incentive for non-producers to purchase and redistribute cannabis. Fourth, a surge in wild hemp eradication coincides with a sharp increase in retail prices, thus creating an opportunity for distributors to cite limited supply as a means of inflating prices and profits. Together, these conclusions suggest that law enforcement agents are limited in their abilities to thwart cannabis production but not to affect market conditions. This is because producers have two options for growing cannabis, indoors and outdoors, and law enforcement agents seem to be better equipped to monitor and sanction the latter. The effects of prohibition on cannabis producers are manifested in transaction costs, which can be minimized by producers who take advantage of their right to privacy. That is, risk can be minimized by resorting to an indoor production method. Fewer producers are caught with the indoor production method, year-round harvests can occur, and growing conditions can be controlled to yield a high-potency crop. These factors suggest that indoor growing is a dominant strategy for cannabis producers.

If we look at all three competing institutions together we can begin to see a clearer picture of the cannabis market. On one hand, cannabis is a commodity that can be produced via cottage industry and bought and sold in an underground market. Individuals can grow self-sustainable quantities for personal consumption, large quantities for distribution, or any combination of the two. Regardless of the quantities being produced, the resource and input costs for cannabis manufacturing are fairly low. Producers can either grow a crop outdoors or indoors, with varying results. Outdoor producers can grow as much cannabis as space allows once per year, and the quality of the crop will depend on the growing season and the climate. Indoor cannabis producers can grow as much cannabis as space allows with a continuous yield, and the
quality of the crop can be controlled. The growing method selected by the producer depends on his or her risk minimizing strategy and the amount of time and effort he or she is willing to devote to the activity.

Law enforcement agents work to monitor and sanction both types of production, but with varying results. In rural locations, law enforcement agencies are generally smaller, space is ample, and tall brush or corn can effectively hide a substantial crop of cannabis. Outdoor producers, as a consequence, have an advantage of space for large quantity production, but they are an easy target for airborne law enforcement operations or the occasional passerby. The institutional arrangements of individual privacy offer protection from searches and seizures if the producer can maintain and withhold evidence of his or her activity. The right to privacy protects the indoor moreso than the outdoor producer because police do not need a warrant if they can see evidence of cannabis production without intruding onto the property.

Information is the other transaction cost of importance for cannabis growers. The amount of information that an individual requires to undertake cannabis cultivation is minimal because cannabis is a robust plant that can grow wildly in all fifty states. As an individual works harder to hide his or her activity, there may be the increased cost of learning new ways to avoid detection, but a producer can offset this cost by learning from other producers and from books like those of Ed Rosenthal. As Rosenthal states, “If you’ve ever grown a backyard tomato, or kept a coleus alive through the winter, you have all the expertise you need to grow plants hydroponically” (1986, 27). The more significant role of information is in the perception of market factors as communicated by participants in that market, such as reasonable wholesale and retail prices, risk, and evasion techniques. This information can be transmitted efficiently by word of mouth, at least.
When an individual makes the decision to break the law and grow cannabis, he or she takes into consideration such factors as risk, information, and expected payoff. When individuals act on their own accord and intentionally disobey cannabis regulations, there is some chance that they will be detected by law enforcement agents. This risk of enforcement contributes to the overall transaction costs that are associated with cannabis production along with the cost of managing information about the activity. As economic actors, cannabis producers can work to minimize risk by growing cannabis indoors, if outdoor production can easily be detected. These choices are part of the informal incentive structure that emerges around cannabis manufacturers as a result of policy and enforcement, the right to privacy, and market institutions.

Conclusions

Cannabis manufacturers can evade prohibitionist institutions and reap the rewards of cannabis production with little effort. This is an unintended consequence of overlapping institutions—drug policy and enforcement and privacy institutions—as discussed in the work of Kathryn Firmin-Sellers (2000, 253-254). She suggests that an individual’s capacity to evade an institution depends largely on the ability of law enforcement agents to monitor and sanction the behavior. It seems that a similar case can be made for cannabis producers because of the competing institutions of prohibition, privacy, and the market, which together provide a zone in which cannabis production can take place for the reward of profit. Indeed, cannabis prohibition threatens an individual’s property (fines) and freedom (time served) as a consequence of growing cannabis. However, the clandestine market for cannabis rewards individuals financially for producing the plant. This overlap could not occur if every individual believed that law enforcement agents were capable of monitoring and sanctioning individual behavior every time it
occurred. Certainly, law enforcement agents sometimes catch cannabis producers—they may even catch them most of the time—but individuals know that their privacy is protected and that cannabis production is a profitable enterprise.

The works of North and Thomas (1973) and North and Weingast (1989) also offer some insight into the behavior of illicit drug manufacturers. Just as the customs of the manor in feudal Europe comprised an unwritten constitution between a lord and his serfs, the market for cannabis is a system of informal institutional arrangements that provide a market, informal rules of the trade, and tips for evading law enforcement agents. The laws, punishments, and enforcement risks of prohibition create transaction costs for cannabis producers that act like a tax on their market behavior, which they can assess through information from other market actors. Consequently, cannabis manufacturers work to minimize this tax by producing indoors, which results in year-round production of controlled-potency marijuana. Cannabis prohibition affects producer behavior by creating and carrying out risk. Due to privacy institutions, prohibitionist institutional arrangements are limited in their jurisdiction.

There are numerous conclusions that one could draw from this analysis. To begin with, cannabis is a plant that, were it not for prohibition, would grow wildly all over the United States as it does all over the world. When cannabis was prohibited, some individuals turned to producing it for sale in clandestine markets. Today, law enforcement practices and the right to privacy render indoor production an efficient risk-minimizing strategy. From an institutional perspective, this is an unintended consequence of cannabis prohibition. Considering the right to privacy and the nature of the plant, indoor grow operations are capable of continuously producing marijuana of the highest potency. As it is stated in the 2004 National Drug Control Strategy, “The United States Government is currently studying ways to improve our estimates
for domestic production, but we cannot wait for perfect intelligence before beginning to deal more aggressively with the serious problem of high-potency indoor grows, at home and abroad” (44). Yet, as this analysis demonstrates, it may be the laws themselves that cause the lack of data and their enforcement that places an incentive on indoor, continuous, high-potency, marijuana production.
ANALYSIS OF METHAMPHETAMINE PRODUCTION

In the last chapter, I showed how cannabis prohibition, the right to privacy, and the market for the drug interact to affect the behavior of cannabis manufacturers. In this chapter, I examine legislation, privacy rights, and market institutions as they affect methamphetamine producers. I will show that methamphetamine production has higher transaction costs than cannabis production, and that institutional factors encourage small-scale, decentralized manufacturer behavior. Specifically, I discuss the efforts and difficulties that producers must endure to make methamphetamine and that there is little producers can do to substantially reduce their transaction costs. This does not mean that the market for methamphetamine will disappear. As we will see, the nature of methamphetamine as a product allows producers to innovate and develop alternative production techniques in response to prohibition and law enforcement efforts. This regular need for innovation itself, however, poses a challenge to producers.

I begin by discussing methamphetamine, how it is commonly produced, and the resources that go into its production. Using excerpts from the Internet, I outline two ways to manufacture methamphetamine, each with different requirements of the producer. Then, I turn to the institutions of prohibition, privacy, and the methamphetamine market to analyze their effects on transaction costs and the resultant producer behavior.

Methamphetamine is a chemically derived stimulant also known as speed, crank, crystal meth, and ice. Most methamphetamine is a powdery substance that varies in purity and color depending upon its ingredients and how it is manufactured. Methamphetamine was discovered in Japan in 1919, 32 years after its cousin, amphetamine (Brecher 1972, 278). Its use as a stimulant by the medical community began about ten years later. By the 1930s, methamphetamine started to be used as an intoxicant by the public, first in the form of Benzedrine, an over-the-counter
Methamphetamine is associated with a variety of chemicals and production processes, leaving potential manufacturers a number of “recipes” from which to “cook” the drug. When clandestine methamphetamine production began, it was most commonly achieved by the amalgam method, which as Gary D. Irvine and Linda Chin explain, “uses phenyl-2-propanone (P2P) and methylanone as the primary precursors” (1991, 34). In 1980, P2P was added to the list
of controlled substances and assigned a Schedule II classification. Some individuals began to illegally manufacture P2P using phenylacetate, acetic anhydride, and sodium acetate or pyridine, which they then sold to methamphetamine laboratories (Irvine and Chin 1991, 36).

Other manufacturers changed to the ephedrine method, which became the dominant means of methamphetamine production because its main ingredients remained widely available. Clandestine chemists also found that the ephedrine method created a much more potent form of the drug:

At least partially as a result of the change in the availability of P2P, in the past several years ephedrine reduction laboratories have become more prevalent, first in southern California, then in areas to the north. The ephedrine reduction process is responsible for more than 90 percent of the methamphetamine currently produced in southern California (Derlet and Heischober 1990). This is a significant shift because the resulting product is d-methamphetamine rather than the racemic mixture of d/l-methamphetamine resulting from the P2P method. D-methamphetamine is 2 to 10 times as physiologically active as l-methamphetamine (Taylor and Snyder 1970). This increased potency translates into increased [central nervous system] stimulation and the potential for increased neurotoxicity (Heischober and Miller 1990).

The ephedrine reduction technique is versatile, offering many substitutable inputs and chemical reactions that can be used to manufacture methamphetamine. Throughout the 1980s and the early 1990s, clandestine laboratories took advantage of over-the-counter products that contained ephedrine, pseudoephedrine, and phenylpropanolamine, such as diet and weight loss supplements. Many estimates suggest that methamphetamine now makes up as much as 80 to 90 percent of the synthetic drugs produced in the United States, which suggests that many of methamphetamine’s ingredients are still widely available (Scott 2002, Clandestine Drug Labs).

The examples I discuss below use the ephedrine reduction technique to produce methamphetamine. Both are simple and can be inexpensive to carry out. They require a variety of inputs, from everyday household goods to heavily regulated chemicals. The following are
paraphrased examples of the red phosphorus and the anhydrous ammonia methods, which I
obtained from the Internet (Rebel 2004; Singe 2004; Skinner 1990, 123-124). I have excluded
the quantities and brand names of chemicals to prevent these procedures from being replicated.

The red phosphorus producer begins by acquiring a few road flares, one bottle of tincture
iodine, a box of herbal decongestant (or ephedrine) pills, a bottle of drain cleaner, a bottle of
white distilled vinegar, a spray can of brake cleaner, and lye. The producer first purifies
pseudoephedrine by emptying the contents of the decongestant capsules into a funnel lined with
a coffee filter. He or she pours cold water through the filter and collects the liquid in a glass jar.
Next, he or she adds some lye to the liquid. The producer puts this solution into another jar, adds
brake cleaner, shakes it vigorously, and then lets it stand and separate. Using a turkey baster, the
producer removes the bottom layer of brake cleaner, and puts it in a bowl. He or she adds vinegar
to the solution and heats it slowly in a water bath. (A water bath can be made simply by heating
the bowl in a frying pan filled with a half-inch of water.) An electric stove must be used because
phosgene (a toxic gas) can be created if the brake cleaner vapors come into contact with a flame.
The producer heats the bowl until the liquid completely evaporates. The resultant solid will be
pseudoephedrine acetate.

Next, the producer prepares the hydrogen iodide solution. He or she scrapes the red
phosphorus off of the caps of the road flares and then sets it aside for later use. The producer
then pours the tincture iodine into a ceramic bowl, heats it on the water bath until the alcohol
evaporates, and then lets it cool. He or she transfers this liquid to a polyethylene jar and adds
some drain cleaner. Then, he or she adds the red phosphorus and heats the bottle in the water
bath until the purple color disappears. He or she adds the pseudoephedrine acetate and heats this

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1 These methods have not been tested for accuracy on account of the legal status of the activity. If they are
somewhat inaccurate, they still reflect the basic manufacturing process for methamphetamine.
solution for 24 hours. Then, the producer lets it cool and adds a dash of lye. He or she places this solution into another jar, adds some brake cleaner, and shakes it. Next, he or she removes the brake cleaner layer with the turkey baster, adds vinegar, and heats this solution in the water bath until the liquid evaporates. Methamphetamine acetate will remain at the bottom of the bowl.

The ingredients required for the red phosphorous method of methamphetamine production are fairly common household goods that can be acquired from a number of legitimate sources. Red phosphorous can be scraped from matches, tincture iodine can be purchased online or from drug stores, and vinegar, brake cleaner, lye, cold pills, and drain cleaner can be procured from a number of retailers. The materials required to manufacture methamphetamine with the red phosphorous method make it ideal for small- or large-scale producers, with the only major disadvantage being the restriction of inputs that I will discuss below. However, the author of this method neglects to address the quality or quantity of the batch, so we can make no assumption about its value. Altogether, the materials required for this method can cost as little as $100.

Let us now turn to the anhydrous ammonia method, which yields a potent (98-100% pure) form of methamphetamine, or ice, in a very large quantity. The producer begins with the following materials: a few gallons of anhydrous ammonia, some lithium batteries (or lithium pills), a few gallons of engine starter fluid, 5,000 ephedrine pills, a glass bottle, a long rubber hose, a bottle of sulfuric acid, a five-gallon bucket, and a ball of aluminum foil. Some of the chemicals used by this method are extremely dangerous, so the producer must exercise extreme caution and wear protective gear for the following few steps.

First, the producer removes the casing of the batteries and retrieves the lithium strips. He or she combines the anhydrous ammonia, ephedrine pills, starter fluid, and lithium strips into the five-gallon bucket. Next, he or she places the sulfuric acid and aluminum foil into the glass jar.
Then, the producer connects the rubber hose to the glass bottle and places the free end of the hose into the bucket. He or she must be careful to not let the sulfuric acid make contact with the anhydrous ammonia or else an explosion will occur. After the bubbling ceases, the producer stirs the solution, scrapes the methamphetamine sludge out of the bottom, and lets it dry. Once it solidifies it can be crushed into powder or left in its solid form as ice. The result will be ¼ pound of high-potency methamphetamine.

The inputs used in this method present potential difficulties for producers. Anhydrous ammonia is a heavily regulated chemical that is only found at agricultural sites or chemical supply companies. It cannot be stored in a simple container because it is corrosive and requires a nitrogen nurse tank (Soil Fertility Management, Re: Price of anhydrous ammonia 1999). Lithium batteries can be purchased on line or through catalogues. Engine starter fluid is available at any auto parts store, and sulfuric acid may be procured from chemical suppliers. Monetarily, this procedure may cost very little to as much as $2,500 to complete. Compared to the red phosphorous method, the anhydrous ammonia method requires a greater investment in time and resources, and it is likely to be reserved for large-scale manufacturers.

The red phosphorus and anhydrous ammonia methods of methamphetamine production can be generalized as follows: The producer first obtains instructions and a number of inputs. Some of the materials are restricted and difficult to obtain, like anhydrous ammonia or ephedrine pills, but most can be found at local hardware stores or large retail outlets. The anhydrous ammonia method places unique complications upon the producer because of the dangers and restrictions associated with its primary ingredient and the especially large number (5,000) of ephedrine pills. Once the ingredients are collected, the manufacturer can begin production, which can take only a few hours to complete. Either method can be used to create a high-potency
product, but between the two cases above, the latter purports to yield ice, the highest purity
methamphetamine.

It is important to recognize that these are just two examples of many manufacturing
alternatives, and they are only meant to show the essential activities associated with
methamphetamine production. In the first stage of production, individuals must learn and select
an appropriate method of production. Then, they must acquire the necessary ingredients. Lastly,
the producer combines the ingredients to synthesize the drug. Any individual who truly wishes to
produce methamphetamine has many options to choose from, which are likely to present
advantages, disadvantages, and trade-offs during the manufacturing process. I will now discuss
these methamphetamine production methods in the context of institutions.

The Institutions of Prohibition, Privacy, and Drug Markets

Methamphetamine, like cannabis, is a drug that can be produced and traded as part of a
clandestine market. Unlike cannabis, however, methamphetamine requires a number of inputs
from the mainstream economy, which the manufacturer must obtain before attempting
production. Here, I analyze methamphetamine producer behavior as it is affected by the
institutions of prohibition, privacy, and the methamphetamine market. I begin by discussing anti-
methamphetamine legislation and enforcement, which are the rules that generate transaction
costs. These costs then restrict producer behavior. Then, I examine the right to privacy and the
extent to which it protects individuals who attempt methamphetamine production. Lastly, I will
discuss the institutional arrangements of clandestine methamphetamine markets, the financial
incentives they offer, and how producers manage transaction costs.
Drug Policy and Enforcement

Methamphetamine is federally classified as a Schedule II drug, which means that it is potentially dangerous, it can be addictive, but it has accepted medicinal benefits (US CSA 1970; Erowid 2004, Methamphetamine Legal Status). Federal and state laws aim to prohibit methamphetamine production by stipulating various penalties for the activity. These penalties—jail sentences and fines—make up the first component of risk for methamphetamine producers, and they differ at the federal and state levels.

The United States currently prohibits first-offense methamphetamine production from 5 to 49 grams (or a 50 to 499 gram mixture) with a mandatory minimum sentence of between 5 and 20 years in prison and a $2 million fine. If death or serious injury occurs during production, then the mandatory minimum sentence increases to between 20 years and life in prison. For manufacture of more than 50 grams (or more than a 500 gram mixture), the penalty increases to a mandatory minimum sentence of between 10 years to life in prison and a $4 million fine (DEA, Federal Trafficking Penalties 2004). Second- and third-offence producers face even higher penalties. Compared to cannabis legislation, these penalties are much more severe. As I explained in the previous chapter, the Federal Government prohibits first-offense cannabis production up to 50 kilograms with a punishment as high as five years and prison and a $250,000 fine. This suggests that methamphetamine producers’ transaction costs are much higher than those of cannabis producers because of the legal risks associated with the activity.

State laws prohibiting the manufacture of methamphetamine vary by quantity measurements, monetary fines, and minimum and maximum sentences specified for the crime. In
Wisconsin, for instance, producing any quantity of methamphetamine is punishable by up to one year in prison and as much as a $5,000 fine. A manufacturer of 28 grams in Louisiana is subject to a mandatory minimum sentence of 10 to 60 years in prison and a $50,000 to $150,000 fine (ImpacTEEN 2003, Chartbook Penalty Data). Here, a criminal defense attorney, who represents numerous drug offenders each year, describes methamphetamine prohibition in Texas:

The statutory ranges are set with the quantities of the drugs that the person is found with...Let’s just use speed for example. This is always a felony. Possession of a controlled substance less than a gram is a state jail felony. That means that the punishment range is a minimum of 180 days in state jail, a maximum of two years. Between one and four grams is a third degree [felony], so you are looking at two to ten in the penitentiary and a fine not to exceed $10,000. Between four and less than 200 grams is a second degree felony and that is two to twenty [years]. Above 200 grams is a first degree felony. And depending on the weight, if it is just a smidgen over 200 grams it is a first degree felony: a minimum of five to a maximum of 99 years in a penitentiary and a fine not to exceed $10,000. If it is more than 454 grams (a pound), then it is usually 15 to 99 years...Sometimes the fine can go up to $250,000. There are a lot of different punishment ranges there. A manufacturing and delivery case, for all except the first degree felony, because you are at the pinnacle right there, you are at the top range, it goes up a grade. So manufacturing and delivery of less than a gram of speed is now a third degree felony. It notches it up a grade, so the punishment range is higher. That is the difference between a straight possession case and either possession with intent to deliver or manufacturing and delivery, as far as the statute is concerned.

As this attorney points out, possession of trace amounts of methamphetamine in Texas carries a minimum sentence of 180 days in jail and a maximum fine of $10,000. Producing less than one gram (approximately the weight of a paperclip) of methamphetamine carries a mandatory minimum sentence of two years in prison and a maximum fine of $10,000. These penalties specify the potential consequences if producers are detected by law enforcement agents while manufacturing the drug. For instance, individuals who produce any quantity of methamphetamine face mandatory minimum jail sentences and fines if they are detected, whereas cannabis producers can be given probation. The federal and state penalties for
manufacturing methamphetamine increase risk and transaction costs with the quantity of the drug produced.

The second component of risk for methamphetamine producers is the probability of being monitored and sanctioned by police during the production process. The probability of being detected during methamphetamine production depends upon the abilities of law enforcement agents to detect the activity and the evasive efforts of manufacturers. To get some idea of law enforcement activity, let us examine some arrest statistics. Figure 2.1 shows the number of arrests for synthetic drugs as a percentage of all drug arrests. (Figures are located in the Appendix.) Here, as in many cases, methamphetamine is grouped with other synthetic drugs, which include amphetamine-type stimulants, as well as MDMA and LSD. Although the figure does not solely address methamphetamine, it does show that arrests for synthetic drugs, including methamphetamine, increased gradually from 1982 to 2002. Because it is as yet impossible to know the exact number of methamphetamine producers operating in the United States at any given time, we cannot know the level of effectiveness at which law enforcement agents monitor and sanction these individuals. However, it is apparent from the hundreds of methamphetamine dump-sites found around the country each year that producers succeed often enough to establish a market (U.S. Forest Service, Law Enforcement and Investigations, 2000).

One difference between cannabis and methamphetamine legislation that increases the probability of methamphetamine producers being caught is commodity control. Law enforcement agents are empowered by commodity control legislation to monitor and sanction individuals before the physical manufacturing process begins. Methamphetamine production requires ingredients that must be purchased or otherwise acquired from external sources. Some ingredients, like pseudoephedrine, ephedrine, aluminum foil, acetone, ammonia, hydrogen
peroxide, and iodine, can be obtained through mainstream retailers. Other ingredients, such as freon, chloroform, phenylacetic acid, phenyl-2-propanone, and hydrochloric acid, must be purchased through chemical or industrial suppliers (Miller and Kozel 1991, 115).

Commodity control requires retailers to prohibit the sale of large quantities of potential methamphetamine ingredients to individuals or document suspicious purchases. This makes obtaining inputs a cumbersome task. As the Drug Enforcement Administration (DEA) states,

Until recently, there were virtually no legal impediments to obtaining the chemicals necessary to manufacture drugs of abuse, no records required to be maintained for inspection, and no penalties for negligence or willful diversion. The Chemical Diversion and Trafficking Act of 1988 extended the concept of commodity control to those chemicals most often used for the manufacture and synthesis of drugs of abuse...In 1993 domestic chemical control was strengthened with the enactment of the Domestic Chemical Diversion Control Act, which added a registration requirement for List I chemical handlers, and removed exemptions in order to prevent diversion of methamphetamine precursor chemicals. Subsequently, Congress passed the Comprehensive Methamphetamine Control Act of 1996 and the Methamphetamine Anti-Proliferation Act of 2000 to pointedly address the growing problem of clandestine methamphetamine manufacturing and abuse in the United States (DEA 2004, Diversion Control).

Commodity control enables law enforcement agents to examine the sales of various chemical retailers and discover anomalous purchases, particularly those that are (or include) List I and II chemicals.² At the federal level, the punishments for possessing these chemicals for unlawful purposes follow closely the punishments for possessing methamphetamine itself (21 USC 841). Commodity control enables law enforcement agents to have many opportunities to monitor and sanction possible methamphetamine manufacturers before production begins. For producers, commodity control increases the risk of detection by requiring that one obtain illegal quantities of mainstream goods and commit other crimes in order to produce methamphetamine. To minimize this risk, producers must continually find new sources of inputs, which increases transaction costs.

² Instead of Schedules, chemicals that are subject to tracking and restriction are assigned to Lists at the federal level.
One of the most recent federal methamphetamine statutes, the Methamphetamine Anti-Proliferation Act of 2000 (MAPA), specifies quantity thresholds that consumers cannot exceed when purchasing certain ingredients. Rather than completely shutting off the supply of these goods, the MAPA and similar laws only make it difficult to get enough of methamphetamine’s ingredients to accomplish its production. The DEA explains the restrictions on pseudoephedrine pills:

If a transaction is 9 grams or greater or a package size is greater than 3 grams, the transaction is regulated. The transaction is allowed, but is subject to the recordkeeping, reporting, and identification requirements of a regulated transaction. Also, the retail distributor is subject to the DEA chemical registration requirement because the exemption from registration for retail sales is restricted to sales below-threshold amounts to individuals for personal medical use (21 CFR 1309.29; DEA, Methamphetamine Anti-Proliferation Act of 2000).

As long as a producer purchases pseudoephedrine pills in less than three-gram packages, he or she can legally acquire this ingredient. The major result of the MAPA and similar legislation is that retailers cannot knowingly sell restricted goods in bulk to potential methamphetamine producers.

In addition to prohibition, law enforcement and other agencies sponsor methamphetamine awareness campaigns to communicate the environmental and safety hazards associated with its production. As more information about methamphetamine production is available to the public, such as how to identify clandestine laboratories, citizens are of increasing assistance to law enforcement agents. In urban areas, this can be an especially useful tactic for detecting methamphetamine producers because there are many places where they can hide. Often the odors permeating from a clandestine methamphetamine lab will alert a neighbor or passerby, who responds by notifying police. Informing people about these odors and the dangers involved is a major part of methamphetamine enforcement because it enables citizens to work on behalf of
police. This ultimately increases transaction costs for producers by creating more informants to evade during production.

Prohibitionist institutions affect methamphetamine producers by increasing the risks associated with the activity. The two major sources of risk for methamphetamine producers come from the penalties they face and the possibility that they will be caught. While the CSA stipulates restrictions for the production of methamphetamine, commodity control laws restrict access to methamphetamine ingredients. Without even producing methamphetamine, the potential manufacturer is subject to penalties at the state and federal level. The result for producers is that there are substantial transaction costs for acquiring the inputs to methamphetamine, as well as for combining them. The result for law enforcement agents is that they have a greater chance of monitoring and sanctioning producers before production. However, these prohibitory tactics do not absolutely prevent methamphetamine production because law enforcement agents are somewhat hindered by individuals’ privacy rights, and producers are not completely debilitated by commodity control. In economic terms, the risks faced by methamphetamine producers raise transaction costs, but the probabilistic nature of enforcement leaves some opportunity for producers to avoid detection. To understand how producers evade monitoring and sanctioning, I now turn to the right to privacy.

The Right to Privacy

Drug policy and enforcement generate substantial risk for methamphetamine producers, and the right to privacy offers them little refuge from law enforcement agents. Methamphetamine producers must make contact with suppliers of ingredients in order for production to take place. As a result, these producers have a much lower expectation of privacy than cannabis growers.
Methamphetamine production also involves dangerous chemical processes that can easily lead to being discovered by neighbors or police. The materials that this drug requires and the nature of the production process increases producers’ exposure to law enforcement agents. While acquiring inputs, methamphetamine producers have little privacy, but during production the right to privacy can offer some protection against law enforcement agents. Such increased exposure creates substantial risk for methamphetamine producers by inflating their probability of detection.

The right to privacy, as mentioned in the previous chapter, comes from the Constitution and a series of case law. The Fourth Amendment, in particular, protects individuals from unlawful searches and seizures, which means that law enforcement agents must acquire enough information about a crime to satisfy probable cause before obtaining a search warrant. Acquiring this information can be as easy as being notified through commodity control channels, observing evidence of the activity from outside the zone of privacy, or learning about the activity from confidential informants. Because methamphetamine uses a number of different commercial products, many of which are dangerous, law enforcement agents have numerous opportunities to monitor and sanction producers outside of their zones of privacy. Choices about the production process and the setting for the operation present manufacturers some opportunities to minimize risk by taking advantage of privacy, but generally these individuals must work hard to minimize their exposure.

The right to privacy contributes somewhat to how methamphetamine manufacturers will minimize their risks, but the characteristics of the drug—its ingredients and how it is made—present challenges to producers that cannot be overcome by simply hiding the activity. Methamphetamine requires manufacturers to interact with mainstream retailers or chemical
suppliers in the course of acquiring ingredients. Commodity control affects methamphetamine producer behavior by limiting their resources, which renders them too scarce for production. This may force determined producers to seek other sources of inputs or different reaction methods. During the acquisition of resources, manufacturer privacy is at a minimum, and the risk of exposure is high. By tracking the storage and sale of these chemicals, commodity control legislation gives law enforcement agents a significant advantage for detecting suspicious activity. Commodity control is quite effective at increasing risk and transaction costs because it focuses on the supply of inputs, which methamphetamine producers cannot control. The only way producers can overcome commodity control obstacles is by seeking inputs elsewhere or choosing a different production strategy. These are both expensive alternatives in terms of transaction costs.

During the synthesis phase of production, the right to privacy may protect manufacturers somewhat, but this depends upon their abilities to contain information about the activity and whether they draw unwanted attention during the acquisition phase. Methamphetamine producers are protected by their privacy rights when the activity takes place in a home or private building as long as evidence of the activity can be withheld. But the toxicity of the inputs and the dangers of production make home-cooking the drug in the same location unsustainable over time. However, if manufacturers can gather the necessary materials, law enforcement agents have very little time to interfere with production. Within the few hours required for synthesis, the manufacturer can conceal the activity depending upon the location he or she has chosen for production.

The locations chosen for methamphetamine production imply different risks for manufacturers. In urban areas, quarters are close, and there is a greater chance of being noticed.
The putrid smell of chemicals can permeate walls and signal passersby that methamphetamine production is afoot. Some producers work on the sides of country roads, others make methamphetamine in campsites, motels, horse trailers, commercial buildings, and even houseboats (Irvine and Chin 1991, 33). Because of the characteristics of methamphetamine, rural and mobile manufacturers can be very effective at evading enforcement. A narcotics task force officer explains:

The clandestine labs are a whole lot more mobile than they were at one time. Basically, they were done in houses and shops and barns out in rural areas, and they would do it there all of the time. What we are seeing now is they are very mobile. They are utilizing hotels, apartments, apartments of friends. They may go to one person’s apartment or hotel room and cook their methamphetamine there. Two or three hours later they are gone, and they take the evidence with them. And by the time we get the information of whatever room, whatever hotel they are cooking dope, we get there and they are gone. They have already checked out or whatever. So that is the problem. They may be at one hotel one night and another hotel the next night, and we just have to try and figure out where they are going to be. And hopefully we can get there in time…We initiated a hotel/motel criminal interdiction program a few months back. Basically what I did was try to educate the hotel staff on what to look for—potential dangers that could be for them or their guests—and we have got some calls that way…With methamphetamine—it’s the smell—a lot of times they will stick a wet towel underneath the door to keep the smell from coming out. They will disable the fire alarms in the rooms and things like that. When the maid shows up to clean the room there may be chemicals combined and reacting. Where before they may not realize that is what it was, now they do.

Mobile producers can choose locations that significantly reduce the probability of being monitored during the process, such as indoors on rural land, where the risk of exposure is limited. But choosing a strategy of mobility can only reduce producers’ risks of being monitored and sanctioned if they can safely transport evidence of production from location to location. The risks of transporting methamphetamine can substantially contribute to the overall transaction costs of production because of the decreased privacy within a vehicle.
Even if producers are able to escape the view of law enforcement agents, laboratory mishaps and dump sites can easily lead to discovery of a methamphetamine operation. A narcotics task force agent states, “With methamphetamine…there is also a public safety element that we contend with. The public safety kind of circumvents peoples’ rights sometimes. If we believe somebody is going to be in danger, then we can go in and do what is necessary, where we might need a warrant some other way.” If, for instance, a clerk at a motel reports one of the guests is producing methamphetamine, then law enforcement agents can intervene without having to wait for a warrant. Clearly, the risks of producing methamphetamine go beyond that of being detected by law enforcement agents.

Since methamphetamine producers need outsourced ingredients for their activities, the risks they face during the production process are much higher than those of cannabis growers. Each person that a methamphetamine producer contacts in the course of obtaining ingredients is a potential informant to law enforcement agents. At this part of the production process, the methamphetamine producer has no realistic expectation of privacy. Once inputs are procured, the right to privacy can be helpful in minimizing the probability of being detected, but only if the manufacturer takes extra steps to assure secrecy. The increased exposure during the manufacturing process increases transaction costs for producers because of the added effort they must expend to hide their activities. To further understand how risks and transaction costs affect methamphetamine producers, I now turn to the institutions of the methamphetamine market.

The Methamphetamine Market

Although methamphetamine is an illegal drug, it is also an industrial good, whose market institutions reflect the availability of inputs and the technologies employed by producers. It is not
enough to describe methamphetamine producers as mere cooks, like most literature does, because in reality they do much more than simply concoct the finished product. At every step of the drug’s production, from obtaining instructions to combining ingredients, manufacturers face a constant risk of being discovered by law enforcement agents. If producers can overcome this risk, then they stand to earn vast profits—at about a $100,000 per wholesale kilogram of methamphetamine. To examine how producers manage this risk and avoid detection, while still profiting from the activity, we must analyze the institutions of the clandestine methamphetamine market as they coexist with prohibition and privacy. In this section, I discuss the effects of prohibition and privacy institutions on methamphetamine manufacturer behavior and the transaction costs that result for different production methods.

The characteristics of inputs, including how they are acquired and stored, play a major role in clandestine methamphetamine production. Consequently, a methamphetamine producer does not select a method from all that are possible, but from those that are available. Prohibiting one good encourages chemists to try new methods of production from a number of alternatives. Whichever production method has the lowest transaction costs will allow for the greatest payoff for producers, ceteris paribus. This is convenient for those producers who understand the chemistry behind methamphetamine and who can take advantage of the prodigious amount of chemicals available through mainstream and underground sources. But it is a disadvantage for lawmakers whose goal it is to limit the availability of such goods. To prohibit methamphetamine, law enforcement agents must not only restrict access to existing ingredients, but also know the newest methods of production to keep up with clandestine chemists. It is methamphetamine’s versatility as a chemical—both in production and its ingredients—that allows it to proliferate.
Since methamphetamine does not occur naturally, producers must rely on the experience of others to make it. Instructions for methamphetamine production are available to anyone willing to pursue them. The two examples presented earlier were retrieved from the Internet; other producers learn production techniques from seasoned experts, fellow inmates, and scientific journals. Teaching someone to produce this drug is illegal, but instructions can be published if they are meant for scientific or research purposes. Although learning a particular production method may be free monetarily, it includes transaction costs, if only because it is an active pursuit on the behalf of an individual. Due to the dangers of the activity, it is likely that most methamphetamine producers learn from first-hand training. The most helpful instructions include where to obtain inputs, evasion tactics, and safety precautions. The effort that one expends when learning a methamphetamine reaction procedure (or the cost of the information) is the first major transaction cost that a producer must incur.

Obtaining ingredients is the next major part of methamphetamine production. And here, too, there are substantial transaction costs that affect producer strategies. At first glance, it may seem that the two methods of methamphetamine production I presented earlier are strikingly similar. Indeed they are if we think about the inputs and the chemical reactions broadly enough. But consider specifically the ingredients required for each of the processes, and the differences between these methods become more conspicuous. Aside from ephedrine- or pseudoephedrine-containing pills, the other ingredients required for red phosphorous or anhydrous ammonia production are different, creating unique transaction costs for different methods of production. While the red phosphorous method uses fairly benign ingredients, the anhydrous ammonia method requires the manufacturer to obtain and store a volatile and dangerous precursor. Using red phosphorous is less efficient because it comes in smaller packages and must often be stripped
from flares or matches, but it is much safer and easier to obtain than anhydrous ammonia. The risks associated with storing and obtaining methamphetamine’s ingredients generate high transaction costs before production.

Because many of methamphetamine’s ingredients are heavily regulated, it is likely that producers will choose methods that allow them the safest and most unfettered access to resources. The degree to which individuals have access to methamphetamine ingredients depends upon their abilities to maneuver around commodity control restrictions. While some ingredients can be obtained quite easily, others are restricted in bulk transactions or if the buyer appears suspicious. One way producers get ingredients is by taking advantage of their versatility. That is, they acquire them legally, but with an ulterior motive. For example, red phosphorous is used in matches and flares, pseudoephedrine is used in over-the-counter cold pills, and engine and brake cleaner are common automotive goods. Many people use these products for legitimate reasons, and the skilled methamphetamine producer knows how to exploit the appearance of legitimacy.

Anhydrous ammonia is probably the most difficult methamphetamine input to acquire legally because it cannot be purchased in small amounts; and anyone who attempts to purchase it is likely to be scrutinized. It is a corrosive and deadly chemical that is intended for use by trained professionals in the fields of agriculture, metallurgy, and refrigeration. Individuals who successfully obtain anhydrous ammonia might steal it or defraud small distributors by appearing to be farmers. Here is an example of a possible attempt to illegally acquire anhydrous ammonia, wherein a professor of soil fertility extension responds to an online agricultural forum guest:

Guest: What [is the] approximate cost of purchasing a 150lb bottle of anhydrous ammonia along with lease of the container?

Professor: Anhydrous ammonia is not sold in lots as small as 150 lb. for fertilizer. I don't know if there is anyone in the refrigeration business that sells in small lots. For your information, anhydrous ammonia sells for about 15-20 cents per pound
of [Nitrogen] and that includes the nurse tank in which it is stored and hauled to
the field. I am curious as to why one would want to purchase such a small amount
of anhydrous ammonia? For corn production, 150 lb would only cover 1 acre or
less on most fields (Soil Fertility Management, Re: Price of anhydrous ammonia
1999).

As the professor points out, the average methamphetamine producer probably does not have the
storage space or the utilities to store a large quantity of anhydrous ammonia, and small
purchases, such as the one inquired about by the guest in the above quotation, are likely to arouse
suspicion. Of course, there is always the possibility that a real farmer might be a
methamphetamine producer, providing a convenient modus operandi for buying anhydrous
ammonia. Because anhydrous ammonia is heavily regulated, there are many instances where this
good is stolen to produce methamphetamine (Environmental Protection Agency, Anhydrous
Ammonia Theft 2000; DEA, State Factsheets 2005).

Other ingredients for methamphetamine production can be obtained through a variety of
legitimate channels. Red phosphorous and cold pills are sold at grocery and convenience stores,
and all auto parts stores carry engine and brake cleaners. At one time, the mainstream availability
of these ingredients presented a generous advantage for methamphetamine producers. In the
early days of clandestine manufacturing, producers could acquire these materials in bulk without
arousing the suspicions of retailers or law enforcement agents. Now, essential ingredients are
restricted by commodity control measures, and they are substantially more difficult to purchase
legitimately. It seems that the greatest source of transaction costs for methamphetamine
producers is commodity control.

However, because it would be unfair to retailers and to the public for lawmakers to
altogether prohibit methamphetamine ingredients—cold pills, matches, and similarly useful
goods—there remain quantity loopholes that producers can exploit. Rather than completely
eliminating the supply of ingredients, commodity control merely increases the risk, time, and effort it takes one to produce methamphetamine. In the course of methamphetamine production, one must obtain illicit quantities of mainstream goods and commit other crimes. The net result of commodity control for manufacturers is an increase in the transaction costs of production, requiring manufacturers’ creativity and effort during the acquisition of inputs.

The chemical reaction of inputs is the next major step of methamphetamine production. Whether learning a production method and obtaining inputs will ever pay off is difficult to predict because there are vast opportunities for problems to occur throughout the procedure. Ingredients may be listed incorrectly in the instructions; a producer may use the wrong brand of something, botch the reaction, or contaminate the final product. As Irvine and Chin illustrate, “…approximately 30 percent of drug laboratories found by the police in Oregon are found secondary to mysterious explosions” (1991, 36; VanDyke 1989). Complications that arise during production can result in the producer losing his or her investment of time, effort, and resources. Errors also typically result in arrest, serious injury, or death. Irvine and Chin add,

Although the production of methamphetamine is a relatively simple process, it can have dangerous consequences and can place several groups of people at risk of exposure to toxic chemicals and its subsequent effects. Those most likely to be exposed include the drug manufacturers; law enforcement officers; local health, fire, and police personnel; residents near laboratory sites; and future occupants of discarded laboratory sites. The chemicals used in the manufacturing process can be corrosive, explosive, flammable, toxic, and possibly, radioactive….The presence of contaminants in the final product of clandestine methamphetamine synthesis presents other health problems. Illicit methamphetamine is not produced under good manufacturing practices. For example, lead acetate used as a reagent in the manufacture of P2P, a precursor of methamphetamine production using the amalgam method, can result in significant quantities of lead being present in the methamphetamine thus produced. In 1987, two cases of acute lead poisoning were reported in intravenous users of illicitly produced methamphetamine in Oregon (Allcott et al. 1987). In 1988, also in Oregon, a cluster of lead poisoning cases was discovered among intravenous methamphetamine drug users (Centers for Disease Control 1990)….Testing of a sample of illicitly produced
methamphetamine produced by one of these cases revealed the presence of 60 percent lead by weight (1991, 36-39).

Methamphetamine can be produced safely, if it occurs in a controlled environment; but it is often the case that clandestine manufacturers have little expertise, making the procedure incredibly dangerous. The consequences of failing to adequately prepare for methamphetamine production are grave, but the market’s existence itself is an indication that safety and efficiency can be achieved in a clandestine setting. The amount of preparation a producer invests, to some extent, minimizes the risk of error, but it increases transaction costs of the procedure.

Methamphetamine prohibition has many aspects that affect different facets of the production process. While commodity control works to restrict inputs before the process begins, other laws restrict the physical production of methamphetamine. The risk of detection depends upon the efforts of law enforcement agents and the manner and degree to which methamphetamine producers hide their behavior. One indication of the risk that producers face is in the number of laboratories seized by federal authorities, as illustrated in Figure 2.2. This graph shows that laboratory seizures increase slightly over the beginning of the 1990s, and then they increase significantly from about 1996 onward. Probably the most astute explanation for this phenomenon comes from Donnie Marshall, Acting Administrator of the DEA, to the Senate Judiciary Committee in 1999:

One of the most important pieces of legislation developed in our nation’s ongoing fight against methamphetamine trafficking and abuse is the Methamphetamine Control Act of 1996 (MCA)....This act specifically targets the diversion of ephedrine combination drug products and drug products containing pseudoephedrine and phenylpropanolamine. As I noted earlier, beginning in 1996, seizures of methamphetamine laboratories began to rise dramatically and early on, almost all of these laboratories were using pseudoephedrine drug products as their source of precursor material. The MCA subjected these products to full regulatory control at the manufacturer and distributor level, allowing us to track the production and sale of these products nationally. It also provided specific
exemptions at the retail level so that legitimate consumers of these products were not affected.

In addition, the MCA provided the impetus for a number of major pharmaceutical retailers to adopt voluntary measures, such as restrictions on the volume of sales of these products, to individual customers. The Drug Enforcement Administration and Wal-Mart have formed a partnership to control large-scale purchases of three key over-the-counter (OTC) products, pseudoephedrine, ephedrine, and phenylpropanolamine, used in the clandestine manufacture of methamphetamine and amphetamine. After meeting with DEA representatives at a national meeting of Wal-Mart pharmacy managers in Kansas City, Missouri, on January 16, 1997, Wal-Mart management moved to restrict sales of these allergy/cold/diet preparations which have been diverted from legitimate use and seized in clandestine labs throughout California, Western, Southwestern, and Midwestern States.

Another major feature of the MCA was the requirement that mail order distributors report their sales to individual users, to the DEA on a monthly basis. These firms had been a major source of pseudoephedrine products for methamphetamine laboratory operators. This reporting requirement, coupled with the fact that these firms were now required to become registered with the DEA, has had a major impact on the activities of these firms (DEA, DEA Congressional Testimony 1999).

Before the MCA, Congress had implemented two other commodity control measures that were poised to stop clandestine methamphetamine manufacturing. The first of these, the Chemical Diversion and Trafficking Act of 1988 (CDTA), restricted some well-known precursors and materials for methamphetamine production—namely ephedrine—and required that individuals be documented when purchasing, importing, or exporting these goods. But it left open a loophole to acquire ephedrine in small, OTC purchases, which individuals exploited until the Domestic Chemical Diversion and Control Act (DCDCA) was passed in 1993. The DCDCA closed the ephedrine OTC loophole but left open the chance for methamphetamine producers to obtain pseudoephedrine through OTC purchases. Only then did the MCA follow by regulating ephedrine, pseudoephedrine, phenylpropanolamine, and a slew of other potential methamphetamine production resources, and by strengthening the penalties for violating provisions. More recently, the Methamphetamine Anti-Proliferation Act (2000) added more law
enforcement agents, stricter penalties, and provisions against instructing individuals on methamphetamine production.

Shortly after the initiation of each of these commodity control statutes, producers began to find ways to circumvent them. Figure 2.3 shows further evidence of this in methamphetamine dosage seizures from 1986 to 2002. As this graph illustrates, seizures of methamphetamine doses spiked four times with the implementation of each commodity control act. It seems that these measures enabled law enforcement agents to temporarily increase the extent of their efforts and catch more methamphetamine producers. But it seems that after each law was issued, substitutes began to be used and production methods were updated, which created options for producers to circumvent commodity control. The number of prohibited inputs is some indication of the options available to producers: Nineteen chemicals were regulated by the Chemical Diversion and Trafficking Act of 1988. By 1993, the number of prohibited chemicals rose to 34 (PL 100-690; Pub. L. 103-200). This is an indication that many substitutes had been tried, and new ingredients were being discovered at the rate of about three per year.

Commodity control is a very effective tool for reducing methamphetamine production, but it does not entirely prevent methamphetamine production. Methamphetamine producers have an overall adaptive advantage over commodity control because they can invent new methods of production using more discrete chemicals. If one chemical is prohibited, then producers can resort to a substitute to decrease the transaction costs of obtaining the original chemical. As a former drug enforcement agent explains,

They have learned to refine their recipes. They changed their recipes. Originally, methamphetamine used to be made in big chemistry labs. I mean, you had a lot of glassware and cookware—what you would see in a college chemistry class. And they would manufacture it like that. And all of it was in a controlled environment, and the labs were very, very big. Now, for a lab all I need is a trunk of a car, and I can transport a lab somewhere. They are always refining. They used to use the
P2P or Red Phosphorous method, which takes longer. Then they switched to the Nazi method... They switched to that for a while, and then they started to get hit with the anhydrous, so they are going back to the P2P method... They change their cooking methods, you know, to adapt to whatever ingredients they can get.

Dynamic production strategies keep the methamphetamine manufacture a step ahead of law enforcement agents. By changing production methods and ingredients, methamphetamine producers can lower the probability that they will be monitored and sanctioned by law enforcement agents. However, changing production methods implies substantial transaction costs, and not every producer will have the resources to research and develop new techniques.

The other interesting point that this interviewee makes is that there is a possible trend of large-scale methamphetamine manufacturing being replaced by small-scale production. The transaction costs of production are lower for small-scale producers because they have fewer ingredients to acquire, they can mobilize their operation, and they have less evidence to conceal from law enforcement agents. A police officer and ex-DEA agent discusses small-scale methamphetamine production and enforcement activities in his jurisdiction:

The main ingredients you have to have for methamphetamine are your pseudoephedrine pills. That has been probably one of their most difficult components to get because it used to be that a lot of them were going into Sam’s and places like that and buying huge cases of cold tablets and stuff like that. Education and restrictions and educating people in Wal Mart, Sam’s, Walgreens, Eckerd, and CVS and all that have really cut that stuff down. A lot of them are hitting these little mom-and-pop grocery stores that are being run by Akmed or somebody like that and they are selling that pseudoephedrine out the back door. Of course, now that is punishable as a federal offense. You are not supposed to sell bulk quantities of that stuff... For a while, the most common method around here is what we call the Nazi Method, or where they use anhydrous ammonia. And with that one you had to have anhydrous ammonia, and that can only be transported in approved containers. So a lot of them were actually going out to rural farm areas to manufacture, you know, where you have farm land because that is used as fertilizer. So they were stealing it from rural areas from farm tanks. They were putting it in your little barbeque tanks... The only problem is that those are not approved containers because your fittings on it are brass, where the ammonia will actually react with the brass and corrode it to the point that it would turn blue. And once it corrodes, if you hit it, it could explode. So another way
[legislators] looked at abating that problem was that it is now a state jail felony if you are transporting anhydrous ammonia in an unapproved container. So you can hit them with the pills, if they got a lot of pills. You can actually hit them if they have the components of a lab. If they have enough stuff where they can actually make dope, but haven’t made dope, you can prosecute them for that. Although in this area, that is not typically done because a lot of your district attorneys really don’t know how to prosecute it and don’t want to because they are so busy with a lot of other stuff…A lot of what the government ends up doing with trying to defer home-grown production was try to cut off your ingredients that you need to manufacture it, trying to hit the different areas, pills, ingredients, and anhydrous.

This police officer suggests that methamphetamine production is generally high-risk, but that small-scale producers have many opportunities to obtain ingredients. Some producers divide the acquisition of the ingredients among their cohort, or over a number of smaller purchases to evade commodity control. Other clandestine manufacturers may smuggle their inputs from neighboring countries, steal them, or use false identities or fake businesses to obtain the goods. Fewer restricted inputs required by producers lead to decreased risk of detection, which implies that small-scale production is a risk-minimizing response to commodity control.

The costs of obtaining inputs combined with the transaction costs of the procedure—including physical and legal risks—make up the total costs of methamphetamine production. But with such a variety of methamphetamine syntheses, it is difficult to accurately estimate the total cost of manufacturing, and thus, the expected profits from the activity. However, we can examine wholesale and retail cost estimates from the United Nations Office on Drugs and Crime (UNODC). In 1999, the UNODC estimated the price of one kilogram of wholesale methamphetamine at an average of $91,125, much higher than the $25,500 estimate in 2001. The estimated retail price for the same quantity was an average of $170,350 in 1999, and approximately $160,000 in 2001. These are not enough data to draw any substantial conclusions about the wholesale and retail markets of methamphetamine; but they do show that the expected profit margins for distributors (those who buy and sell the drug without producing it) increased...

When we examine price and consumption data, it is clear that legislation may have a limited effect on the methamphetamine market. As these data show, arrests increase after each instance of commodity legislation, but then increase shortly after. Figures 2.4 and 2.5 are from the Office of National Drug Control Policy 2001 report, “What America’s Users Spend on Illegal Drugs.” Figure 2.4 shows the average price per ounce of methamphetamine, and Figure 2.5 shows the estimated number of metric tons of methamphetamine consumed annually. Both figures span just over a decade, from 1988 to 2000. Alone, they suggest that price and consumption of methamphetamine are indirectly related. But when we also take into account Figures 2.2 and 2.3, we get a better indication of the causal mechanisms behind price and consumption. Figure 2.3 shows that the annual number of methamphetamine dosage seizures surge four times corresponding to legislation enacted in 1988, 1993, 1996, and 2000. It appears that the 1988 peak in methamphetamine dosage seizures corresponds with the increased price and decreased consumption during the early 1990s. But by 1992, dosage seizures returned to their pre-CDTA level. Meanwhile, according to Figures 2.4 and 2.5, prices declined and consumption increased. In 1992, dosage seizures increased again, most likely in correspondence to the DCDCA; but again, producers exploited commodity control loopholes, and prices continued to decline while consumption increased. The price of methamphetamine landed at just under $200 per ounce in 1995, the same year that consumption peaked. In response to mounting methamphetamine consumption, the MCA was passed in 1996, which stirred more seizures of dosages and, for the first time ever, substantial efforts to detect clandestine labs. Throughout the
rest of the 1990s, prices increased and consumption decreased in response to the MCA and the MAPA.

It is clear that manufacturers invest time, effort, and money in learning a production method and pulling together resources, but many of these costs are intangible or have no discrete monetary value. One who has a close friend who produces methamphetamine, for instance, might incur only a small cost of effort to learn a procedure. Others may have to research and test methods before settling on one that works. Producers must choose instructions that they can feasibly access, with ingredients that they can reasonably obtain. Depending on what inputs one steals or purchases, the location he or she chooses, and the method employed, the total costs of production can be anything from free to quite costly. Similarly, in terms of profits, a producer may be compensated by enjoying the fruits of his or her labor, selling the drug for cash, or both. Physically manufacturing methamphetamine bears significant transaction costs growing to cannabis. Methamphetamine producers face massive transaction costs while acquiring goods and potentially high transaction costs while hiding production. If a methamphetamine producer also uses the drug, it is most efficient to manufacture a small amount for personal use and sell the remainder to a few closely related consumers.

Conclusions

The clandestine methamphetamine market is a unique economic environment because it was created as a consequence of the medical industry. Methamphetamine was discovered as part of a legitimate business or scientific endeavor, without foresight of what could become of it. It was only after methamphetamine was declared unsafe for prescription use that it became a controlled substance. The clandestine market that resulted from its prohibition is a potentially
profitable arena for illicit enterprise, where even mainstream industries benefit. The heyday for methamphetamine producers was in the 1970s, just after it was prohibited and before commodity control began. There were no restrictions on methamphetamine’s inputs, and goods like P2P could be purchased in bulk. Once it became apparent that clandestine methamphetamine production was spreading, steps were taken to put in place some prohibitory mechanisms that sought to increase the transaction costs of production.

The modern clandestine methamphetamine producer begins by learning a procedure for the activity. This is the first major transaction cost that producers incur. Once the producer obtains this information, he or she can begin the input acquisition phase of production. In this phase, the producer faces high transaction costs for inquiring ingredients because of commodity control restrictions. To circumvent these restrictions, producers may import ingredients from other countries, steal them, or fraudulently purchase them. After the producer gathers inputs, he or she is ready to synthesize the drug. The right to privacy somewhat protects producers during synthesis, but only to the extent that they can minimize their exposure. The efforts producers expend to hide their activities are a substantial increase to the transaction costs of methamphetamine production. The three major sources of transaction costs, information, acquisition of inputs, and the efforts applied to avoid detection, are high compared to the case of cannabis manufacturers, who may simply move indoors to hide their activity.

Although we could certainly benefit from more data on the methamphetamine market, there are some basic conclusions that can be drawn from what I have presented in this chapter. First, methamphetamine is an extremely profitable endeavor, but it is also incredibly risky. While it may seem that individuals can take a small investment in some household goods and turn a $100,000 profit, in reality methamphetamine producers spend much effort and time acquiring

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inputs and hiding their tracks. Methamphetamine producers must circumvent law enforcement agents before and during production, which inflates the transaction costs that would otherwise be associated with acquiring inputs. The consequences are not only that more methamphetamine producers are caught, but also that risk increases for those who are not caught.

Second, the right to privacy does not offer much protection to the methamphetamine producer because acquiring inputs is a socially interactive process. Because of commodity control, producers may find it difficult to acquire enough ingredients to create the drug. This is remarkably different from cannabis production, where the quantity produced is limited by the growers’ abilities to withhold information about production within a confined space. While some individuals will inevitably be able to acquire enough of methamphetamine’s ingredients to produce the drug on a grand scale, most producers, it seems, are forced to operate on a smaller scale due to commodity control. Small-scale production implies that producers can hide the activity more effectively, and they require fewer inputs to begin the process. There is less methamphetamine manufactured and sold in one round of small-scale production, but this approach substantially minimizes the risk of exposure to law enforcement agents.

Interdependence is a substantial part of methamphetamine production. Methamphetamine manufacturers are industrial producers, who assemble a product using raw materials. The enterprise is illegal, but this only contributes non-monetary risk to the production process. Once the producer learns a recipe, he or she only requires goods that may be difficult to obtain. Then, production can begin, but only after the producer has participated in the mainstream economy.

Methamphetamine producers face a number of challenges that result from legislation, enforcement, and the characteristics of the drug. Each of the challenges, whether input availability, production difficulties, safety hazards, or law enforcement, affect methamphetamine
producers by creating and increasing transaction costs. However, because of the variety of inputs and production methods, manufacturers have many options available that can minimize transaction costs to a point where the activity can be profitable. Commodity control is an effective tactic, but it must be constantly updated to reflect new manufacturing processes. As more industrial goods become available to the public it seems that methamphetamine producers will only have more options available to them. Consequently, legislators and law enforcement agents will have to continue to alter methamphetamine prohibition to reflect the changes of producer behavior.
CONCLUSION

In this thesis, I set out to answer how drug policy and enforcement affect illicit drug manufacturers. I chose an institutional approach to this problem because illicit drug manufacturing is an economic activity that is constrained by rules, enforcement, and incentives. I explained the nature of the illegal drug problem in the United States and how different institutions interact to determine producers’ transaction costs. I examined cannabis and methamphetamine production and the transaction costs associated with these activities. I discussed how cannabis manufacturers tend to choose small, indoor, independent production strategies and how methamphetamine producers also choose small, decentralized strategies, but with greater overall transaction costs. In this chapter, I compare major results of the analyses, and I draw conclusions about how drug manufacturers’ behaviors are affected by drug policy and enforcement.

Earlier, I presented a few examples of institutional analyses to demonstrate how people react to rules and enforcement and their reciprocal economic effects. These examples (North and Thomas 1973; North and Weingast 1989; Firmin-Sellers 2000) discuss property rights, transaction costs, and evasion, and how they can greatly affect the growth and development of markets. In each of these works, we see that individual behavior is affected not only by rules as they are declared, but also by the manners in which the rules are enforced. Individuals have limited property rights to the drugs they produce. There are no rights to manufacture, use, sell, distribute, or possess drugs. Some producers disguise their work, change locations frequently, and work in sparsely inhabited areas to lower transaction costs. Whatever the evasive strategy chosen by manufacturers, the intent is to carry out the production process, from gathering inputs to distribution (or consumption) of the final product, without being caught. This means that illicit
drug manufacturers must keep sensory data of their operations from police—even agents of the police in the form of concerned citizens. Without secrecy, an illicit drug manufacturer is almost certain to be apprehended.¹

Under the current set of prohibitionist institutions, producers are punished with fines and imprisonment if caught growing cannabis or manufacturing methamphetamine. Cannabis growers are punished with jail time and fines that range from probation to life imprisonment and millions of dollars in fines. Methamphetamine producers face penalties that range from two-year mandatory minimum sentences to life imprisonment and millions of dollars in fines. These punishments create enormous risk for both cannabis and methamphetamine producers, but because of the characteristics of the production process, law enforcement agents cannot monitor and sanction every manufacturer. This inability is largely the result of the individual’s right to privacy.

The right to privacy protects cannabis manufacturers because the entire process may occur in relative secrecy. Whether behind walls and fences, in basements or closets, or far off in rural farmland, cannabis manufacturing can be a difficult activity to notice when it is hidden well. Methamphetamine production cannot occur with the same degree of privacy because it involves the acquisition of regulated inputs, which increases manufacturers’ exposure. During the reaction phase of methamphetamine production, manufacturers can somewhat protect their privacy depending on where they carry out their activity. But lingering chemical odors and the occasional exploding laboratory can easily alert law enforcement agents and concerned citizens. Cannabis growers face much lower transaction costs than methamphetamine producers, not only

¹ An exception should be made for the case of organized crime involving police officers, which is a serious problem but beyond the scope of this essay.
because cannabis is easier to hide and more mildly punished, but also because methamphetamine producers are subject to commodity control measures.

Cannabis and methamphetamine are diverse substances. They have their own specific production processes and inputs, which require unique efforts on behalf of producers. Cannabis is a plant that can be cultivated, but it can also occur naturally. There are two basic strategies to produce cannabis: indoors and outdoors. Choosing an indoor strategy generally requires more effort and resources, but the producer yields a higher-quality plant, saves time, produces a continuous crop, and easily evades detection. An outdoor growing strategy saves effort, but it yields only one crop per year. Outdoor growing also increases a cannabis producer’s exposure and risk of detection because it occurs in the open.

Methamphetamine, on the other hand, is a chemical compound that requires increasingly rare ingredients and some level of expertise on behalf of the producer. Before methamphetamine production begins, a producer must learn instructions and gather ingredients. Anyone can learn how to produce the drug, but acquiring ingredients is difficult because commodity control legislation restricts their availability. Most of methamphetamine’s inputs can be purchased from mainstream retailers and distributors, but they are restricted in large quantities or suspicious combinations. Methamphetamine producers have few options to overcome this obstacle: They can import or smuggle ingredients from other countries, they can steal them, or they can seek new production methods. Once the ingredients are collected, methamphetamine producers need only a few hours in isolation to synthesize their drug.

Methamphetamine production is considerably more challenging to undertake because of commodity control, which raises transaction costs. Commodity control contributes to the major differences in transaction costs for the production of cannabis and methamphetamine. Cannabis
production is simple to carry out and, to some extent, easy to hide. Because of the limitations on ingredients, methamphetamine producers have higher transaction costs associated with their activity. This means that some producers may opt out of the market when a particular good becomes controlled (or when transaction costs become too expensive). The market may have limited growth potential, as a result.

The penalties for drug production vary directly with the value of the illegal assets, compounding the risk of being monitored and sanctioned with the quantity of drugs produced. Together, with the risk of being arrested, fines, and jail sentences inflating transaction costs of production, these factors create a general disincentive to engage in drug manufacturing. Overall, they successfully prohibit the activity, as most United States citizens do not produce illegal drugs. Most people require no policing because they adhere to drug prohibition. But the smaller group of individuals that does not adhere to prohibition requires monitoring and sanctioning. Unless they are detected, producers remain active, operating with a constant risk of being detected.

While the intentions of drug policy and enforcement may be to eliminate certain drugs and their use, it should not be forgotten that the Bill of Rights exists to strike a balance between the rights of individuals and those of the state. Part of this balance is the right to privacy, which grants individuals a space that the government may not enter without probable cause or reasonable suspicion. In some places, privacy is more protected than in others. For drug manufacturers, whether law enforcement agents will find a reasonable suspicion depends upon producers’ evasion skills, law enforcement agents’ monitoring skills, and the nature of the contraband being produced. These factors are interrelated and inseparable. Producers evade detection depending on what drug they produce and how law enforcement agents monitor and
sanction the activity: law enforcement agents monitor and sanction producers differently depending on how they attempt to evade detection and which drugs they try to produce. As institutions overlap, actors are faced with competing incentives and restrictions. In the case of illicit drug market actors, incentives exist to manufacture drugs, but at the same time they are discouraged from the activity by legislation and enforcement.

There are some people who are willing to manage the risks of being monitored and sanctioned by law enforcement agents for the promise of drugs or cash. Prohibitionist institutions exist to restrict individuals from ingesting various psychoactive substances, and they work by limiting the activities associated with these goods. Producers, distributors, and consumers of many different drugs face great risks for the ends that they pursue. A more thorough analysis would attempt to describe institutional aspects of prohibition for each of these market roles, focusing perhaps on the effects of drug policy and enforcement on producers of different drugs, whether natural, extracted, or synthesized. It would also be interesting to expand the scope of the analysis to include the institutional factors behind how and in what interest these laws are made. Only by continuing to ask such questions can we begin to truly understand the indirect and direct effects of drug policy and enforcement on drug market actors.
APPENDIX

FIGURES
Figure 1.1: Number of Arrests for Cannabis and Other Drugs

Source: FBI, Uniform Crime Reports, Crime in the United States, annually.

Figure 1.2: US Domestic Cannabis Seizures and Total Drug Seizures

Source: Table adapted by SOURCEBOOK staff from tables provided by the U.S. Department of Justice, Drug Enforcement Administration, Federal-wide Drug Seizure System.
Figure 1.3: Metric Tons of Cannabis Consumed in the US


Figure 1.4: US Arrests for Cannabis by Activity as Percentage of All Drug Arrests

Figure 1.5: US Cannabis Eradication by Growing Method by DCE/SP


Figure 1.6: Average Wholesale and Retail Prices Per Kilogram of Cannabis

Source: UNODC, Global Illicit Drug Trends, annually.
Figure 1.7: US Cannabis Eradication by Growing Method by DCE/SP


Figure 2.1: Arrests for Synthetic Drugs Compared to Other Drugs

Source: FBI, Uniform Crime Reports, Crime in the United States, annually.
Figure 2.2: Number of Labs Seized in US


Figure 2.3: US Methamphetamine Seizures

Source: DEA Stride Database
Figure 2.4: Price Per Ounce in $US


Figure 2.5: Metric Tons of Methamphetamine Consumed in the US

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