Abt Associates Inc.

Using ADAM Data to Investigate the Effectiveness of Law Enforcement

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Abstract

The Arrestee Drug Abuse Monitoring (ADAM) survey was sponsored by the National Institute of Justice between 2000 and 2003 and was revived by the Office of National Drug Control Policy during 2006. Administered in over 40 counties between 2000 and 2003, ADAM is a probability sample of arrestees who are asked about their drug use and drug market participation. In particular, the market participation questions provide useful data to profile markets used by chronic users whose market behavior is difficult to capture through general population surveys. This paper answers the question: Can arrestee's responses to survey questions provide a basis for evaluating the effectiveness of drug law enforcement interventions? The Abt Associates research team assembled ADAM data from ten counties and matched the ADAM data with illegal drug prices from the System to Retrieve Information from Drug Evidence and with law enforcement data captured principally through newspaper accounts and verified with police when possible. Findings are that (1) major enforcement events appear to affect markets, causing buyers to alter their purchasing behaviors; (2) major enforcement events appear to temporarily reduce supply and increase illegal drug prices, although the effect is difficult to identify because of the absence of county-specific price data, and (3) major enforcement events appear to have no important effect on consumption, apparently because markets adjust by substituting lower purity drugs when drugs are in relatively short supply.

Summary

The federal Government's anti-drug control strategy is based on the "…fundamental insight that the illegal drug trade is a market, and both users and traffickers are affected by market dynamics. By disrupting this market … [the Government] … seeks to undermine the ability of drug suppliers to meet, expand, and profit from drug demand." (Office of National Drug Control Policy, National Drug Control Strategy, 2006, p.17.) ONDCP's primary focus is on interdiction and eradication, but its market observation is equally applicable to the local-level buying and selling of drugs. The National Research Council (2001) defines a retail drug market as a "…set of people, facilities, and procedures through which a drug such as cocaine is transferred from suppliers to users. Users and suppliers interact through retail markets." As emphasized by the NRC, understanding how law enforcement works to reduce drug use is hindered by limited empirical research on local drug markets.

The research reported in this paper investigates the use of ADAM data to develop an empirical profile of retail drug markets across ten urban counties. The profile is derived from responses that drug buyers provide to questions about how they contacted the seller and where they made the purchase as well as other questions about market activities. We then investigate whether or not episodes of targeted law enforcement have had an impact on the markets described by those profiles. "Targeted" law enforcement means activities such as arresting members of major distribution networks, in contrast with "routine" law enforcement comprising all activities that occur more or less continuously. The research reported here says nothing about the effectiveness of routine forms of enforcement, because routine enforcement has been relatively constant over the short four-year timeframe of this study.

Targeted enforcement appears to affect the way that drug users purchase illegal drugs. However, the direction of that effect is inconsistent across the ten counties. Targeted enforcement appears to increase the real price of illegal drugs by reducing the purity of drugs bought and sold in retail markets. Evidence of this effect is not especially strong, however.

While this paper is a research report about self-reported drug market activity, our overarching interest is in developing a tool that police could use to evaluate episodic but major enforcement initiatives. If an ADAM-type program of interviewing arrested drug users is useful for conducting such evaluations, one might see this present study as justification for fielding ADAM-type programs widely. That expansion would build on the ADAM program sponsored by the National Institute of Justice from 2000 through 2003 and the revived ADAM program begun by the Office of National Drug Control Policy in 2007. It would have to include systematic collection of data about major enforcement events, which does not presently exist, and systematic collection of price/purity data for drugs exchanged at retail.

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Using ADAM Data to Investigate the Effectiveness of Law Enforcement

The federal Government's anti-drug control strategy is based on the "…fundamental insight that the illegal drug trade is a market, and both users and traffickers are affected by market dynamics. By disrupting this market … [the Government] … seeks to undermine the ability of drug suppliers to meet, expand, and profit from drug demand." (Office of National Drug Control Policy, National Drug Control Strategy, 2006, p.17.) ONDCP's primary focus is on interdiction and eradication, but its market observation is equally applicable to the local-level buying and selling of drugs.

Understanding how law enforcement works to reduce drug use is hindered by a limited empirical research on local drug markets. The National Research Council (2001) defines a retail drug market as a "…set of people, facilities, and procedures through which a drug such as cocaine is transferred from suppliers to users. Users and suppliers interact through retail markets." The NRC points out: "…economic analysis of legal markets uses data on prices, purchase frequencies, quantities bought and sold … and other variables. Reliable data of these kinds on markets for illegal drugs do not exist. … And because they do not exist, current knowledge of these markets is based largely on investigations by ethnographers and journalists … (which is) … largely descriptive and case-specific." (NRC, 2001, p. 160-162.) The NRC did not consider data from the Arrestee Drug Abuse Monitoring system during its review, however, and Taylor and Brownstein (2003) have shown that ADAM can provide descriptive profiles of illegal drug markets. The study reported in this present paper also uses market data from ADAM interviews, but while Taylor and Brownstein used the ADAM data from just four sites for 2000, our analysis uses data from ten counties for 2000 through 2003.

Specifically, the research reported in this paper investigates the use of ADAM data to develop an empirical profile of retail drug markets across ten urban counties. The profile is based on drug user responses to questions about where and how they bought their drugs as well as other questions about market behaviors. We then investigate whether or not episodes of targeted law enforcement have had an impact on those markets. "Targeted" law enforcement means activities such as arresting members of major distribution networks, in contrast with "routine" law enforcement comprising all activities that occur more or less continuously. The research reported here says nothing about the effectiveness of routine forms of enforcement, because routine enforcement has been relatively constant over the short four-year timeframe of this study. Hereafter, when we use the terms *enforcement* and *law enforcement*, we are referencing targeted enforcement activities that operate by eliminating or seriously undermining major drug-dealing organizations.

This paper is silent on other important topics as well. The profile provided by this paper says nothing about the geographic location where markets form and disband, or how markets are distributed across an urban area (Rengert, Radcliffe and Chakravorty, 2005). It is limited to characteristics of those markets – from whom buyers make purchases, how they locate sellers, where they make drug transactions, and other aspects of market behaviors potentially affected by enforcement. This set does not exhaust all the interesting questions that we would like to answer about drug markets, of course. Moreover, we deal with illegal drug markets generically. For example, we estimate the proportion of purchases made in public or open air settings, and sometime we refine this to mean purchasing within a public park, but we are not interested in estimating the number of purchases that occur in a park at 100 East Street. We examine counties as a whole, while other research typically deals with markets at the

level of a neighborhood or single precinct (Preble and Casey, 1969; Curtis and Sviridoff, 1994) or a housing project or census tract (Fagan, Davis and Holland, 2005). Studying markets across a county is dictated by the source of our data (ADAM), which provides county level estimates of drug use.

While this paper is a research report about self-reported drug market activity, our overarching interest is to determine if an ADAM-type program of interviewing arrested drug users could be useful for conducting evaluations of police anti-drug programs. The ADAM survey is concerned with drug use and limited market activities. It was not designed to answer questions that would be most pertinent to evaluating law enforcement practices. Hence, when we say an ADAM-type program, we mean jail-based surveys that use the ADAM protocols but not necessarily the ADAM questions. Of course, to demonstrate how ADAM-type programs might provide a basis for evaluating enforcement practices, we have to use the extant ADAM market questions.

Section 1.0 provides a literature review. This review establishes expectations for how we anticipate that markets react to enforcement activity. Section 2.0 describes the data. Principal data sources are the Arrestee Drug Abuse Monitoring (ADAM) survey from 2000 through 2003, enforcement data taken from news accounts and police verification from 1999 through 2003, and illicit drug price data from the System to Retrieve Information from Drug Evidence (STRIDE) for 1999 through 2003. The third section discusses the analysis plan and the fourth section presents findings. The fifth section concludes.

1.0 Literature Review

While the NRC's review has identified limited empirical research on illegal drug markets, that observation does not mean that thoughtful and informative research is altogether absent. There is a rich tradition of ethnographic work on markets and buyer/seller behaviors. We review this and other relevant literature to uncover themes that are useful for understanding illegal drug markets and law enforcement effectiveness as we approach those subjects in this paper.

Multiplicity of Markets

Markets exist at all levels of the drug production and distribution chain. We are concerned with buying and selling in relatively low-level wholesale and retail markets, because ADAM questions arrestees about their purchases in retail markets. Specifically, we expect that targeted enforcement will remove illegal drugs from the distribution chain, and that eventually a shortage will affect retail markets. Likely the effect will be ephemeral as the remaining upper level dealers increase supply or new upper level dealers enter the market.

It would be mistaken to equate retail level dealing as occurring in a single market, because a single city or community is likely to have multiple drug markets. See Hough and Natarajan, 2000; Lupton et al., 2002; Curtis, Wendel and Spunt, 2002; Rengert, Ratcliffe and Chakravorty, 2005. Also, because of the source of our data (male arrestees in major urban areas), we are principally investigating the market behaviors of adult male buyers who have years of experience purchasing illegal drugs. The market behavior of this group should be distinguished from the market behaviors of younger and less experienced recreational users, who may principally acquire drugs through social networks (Parker, 2000), and are unlikely to come into contact with the adult criminal justice system.

Markets are most often drug specific. For example, marijuana markets appear to be different from the markets for "hard" drugs (Caulkins and Padula, 2006), but even "hard" drug markets are diverse. In this regard, several researchers have reported that methamphetamine markets differ from the markets for cocaine and heroin. According to research in Western methamphetamine markets (Eck, 1995; Pennel et al., 1999, Rodriguez et al., 2005), methamphetamine is frequently sold in relational markets, that is, through social networks and in private dwelling rather than through more organized channels. Relational markets may also be more common when users are geographically dispersed or middle class (Pierce, 1999; Waldorf, Reinarman and Murphy, 1991). In contract, in his study of crack dealing, Jacobs (1999) reported that crack dealers in St. Louis were less organized than were other drug dealers. For a similar view, see Buerger (1992).

Moreover, markets are dynamic; they evolve over time as demand changes. Different types of distributors enter or external pressures produce adaptation (Curtis and Sviordi, 1994). As an example, changes in legislation restricting the sale of ephedrine and pseudoephedrine, precursor chemicals used in the manufacture of methamphetamine, resulted in decreased seizures of "mom and pop" laboratories but increased the attractiveness of the established demand to larger, more organized methamphetamine distributors (Hunt, Kuck and Truitt, 2005).

Thus, as targeted enforcement removes drugs from upper-level distribution chains, an eventual shortage will affect sales in retail markets. However, we expect the nature of those changes to vary over the ten counties included in this study, and we expect the nature of those changes to vary with the type of drug being exchanged. Possibly the adjustments of more experienced buyers will differ from the adjustments of less experienced buyers, as the former may be better at adapting to short-run market variations.

How do traffickers and dealers structure their business?

Two polar extremes characterize the organizational structure for producing, trafficking and selling illegal drugs. Drug dealing may be organized crime, wherein permanent organizations employee staff with differentiated roles, although the organizations are still small scale compared with traditional organized crime such as Cosa Nostra. At the other extreme, drug dealing may be atomistic with loosely connected traffickers and dealers who tend to interchange roles.

For example, Natarajan (2006) analyzed 2400 wiretap conversations between 294 individuals associated with a single prosecution in New York City during the early 1990s. Based on this evidence, she characterizes heroin distribution as comprising a loosely structured network of affiliated groups whose members opportunistically adopt interchangeable roles. She opines (p. 189) that the apparent organization "…had no real structural existence beyond that imposed on it by the actions of law enforcement." Consistent with this view, Eck and Gersh characterize drug trafficking as a "cottage industry"; that is a structure "from importation to retail handled by a large number of small groups and individuals…and no group or individual controls a large proportion of the drugs brought into an area (p.244). This is the same characterization given for middle market drug distribution in the United Kingdom (Pearson and Hobbs, 2001) and in Sydney, Australia (Coomber and Maher, 2006). Other researchers agree with this characterization (Reuter and Haaga ,1989; Jacobs, 1999; Reuter, 2004; Vellinga, 2004).

Curtis and Sviridoff (1994) argue that multiple types of social organizations characterize drug dealing and they describe ideal types of organizations for the same drugs in different parts of Brooklyn ----

from very complex forms ("corporations") to loosely connected freelance organizations of distributors. Freelance distribution markets are made up of individual bosses running small, ad hoc distribution networks. Family based organizations are distributors whose membership is based on kinship organizations; the structure can involve large numbers of individuals all working in the family business. Culture based organizations are often organizations whose hierarchy and membership are based on common ethnicity, neighborhood or religion and whose rewards and advancement are based on performance rather than familial ties. Corporations are highly structured organizations operating more like traditional business or corporate models.

The National Drug Intelligence Center (2006) identifies organizations that appear to operate much like the corporation model described by Curtis and Sviridoff. NDIC's characterization describes formal and relatively permanent trafficking organizations. According to NDIC (p. i):

> Mexican drug trafficking organizations and criminal groups are the most influential drug traffickers in the United States … They are the predominant smugglers, transporters, and wholesale distributors of cocaine, marijuana, methamphetamine, and Mexico-produced heroin in the United States and are increasing their control over the distribution of these drugs in areas long controlled by Colombian and Dominican criminal groups …

NDIC also observes (p. 32):

> Street gangs and prison gangs …[have evolved] … from primarily retail level distributors of drugs to significant smugglers, transporters, and wholesale distributors. … Many gangs have evolved from turf-oriented gangs to profit driven, organized criminal enterprises whose activities include not only retail drug distribution but also other aspects of trade, including smuggling, transportation, and wholesale distribution.

Other researchers (Fuentes, 1998) agree with this organized crime view. In fact, Levitt and Venkatesh (2000) were able to study the dealings of a single drug-dealing gang because it was sufficiently sophisticated to leave business records. From those records, Levitt and Venkatesh characterized the enterprise as being managed by a central leadership of four to six members who set strategy and dealt with suppliers and twelve people who managed the business relationships with about 100 local gang leaders. Answering to those leaders were three officers who dealt with safety concerns, financial issues and drug transportation. Lower level gang members were enforcers and street-level distributors. Levitt and Venkatesh characterize the market structure as a "franchise".

Whether illicit drug markets are organized or unorganized may be a sterile debate. Local drug distribution occurs through multiple markets. For example, Curtis, Wendel and Spunt (2002, p.29) report that structured franchise operations sell drugs in the Lower East Side (New York) neighborhood, but so do freelance distributors and socially bonded distributors; Johnson, Dunlap and Tourigny (2000) provide a similar assessment. May et al. (2000) report the same in two English drug markets. After reviewing the international literature, Dorn and King (2005, p. 18) conclude "…it is not easy to come to neat conclusions. Hierarchies and tightly structured organizations come and go. Core groups, drawing in specialists, affiliates and others to do particular jobs, existed in the past and do today. Networking between players is vital today but it was less so previously." Furthermore, we note from an economic perspective that a higher-level dealer will maximize his or her profits by having distributors who work

in very competitive markets. What social scientists observe may be attempts to monopolize distribution at wholesale and to assure competition at retail.

If major enforcement events disrupt local drug markets, then we might be willing to conclude that middle-level drug markets are sufficiently organized and that this type of enforcement can be effective. The corollary is not necessarily true, however. Enforcement may be ineffective even when it is successful at removing the principals of an organized crime conspiracy. Building on a framework proposed by Buchanan (1974), Caulkins, Reuter and Taylor (2006) argue that organized crime has an incentive to restrict supply to increase prices and profits, sustaining monopoly power by resorting to violence. Police removal of an aggressive monopolist provides the opportunity for less aggressive dealers, thereby reducing drug prices and increasing the availability of drugs. In this regard, enforcement can perversely increase drug availability. Still, we anticipate that a change from a monopolistic to a more competitive market structure would require a period of adjustment as new dealers would have to locate suppliers; established buyers would have to locate new dealers; and in the meantime, drugs would be in short supply with continued incentives to maintain high prices.

In summary, the literature is contradictory with respect to the organizational structure of illicit drug dealing. This may be because there is no good definition of organization, so different researchers can attach different names to the same organizations. Or, it may be because trading is relatively atomistic at the retail level and more organized at the wholesale level, but distinguishing between the two levels is difficult so descriptions are confused. But more likely, there seem to be multiple dealing organizations in any single place, and they vary widely in organizational sophistication; moreover, the mixture of organized and atomistic dealing varies from city-to-city. For purpose of this study, we are agnostic about organizational structure. If there appears to be a relationship between targeted law enforcement and markets, then we would conclude that drug dealing is sufficiently organized that it can in fact be disrupted by law enforcement; if not, then presumably targeted enforcement is ineffective because it can never remove sufficient supply to cause shortages in retail markets. We leave this as an empirical question to be investigated in this study.

Are Markets Open or Closed?

What would we expect to observe as law enforcement effectively disrupts the supply of illegal drugs? Harocopos and Hough (2005) distinguish between drug markets that rely on social networks to facilitate market transactions (closed markets) and those that are place-specific (open markets). In an open market, dealers sell to both repeat customers and strangers. Absent law enforcement, openness is efficient because it reduces search costs and reduces the risk from de novo negotiations. Of course, given law enforcement, sellers have an incentive to move operations away from public view, and to deal with a more restrictive clientele. Harocopos and Hough (p. 2) argue that law enforcement can force markets to transform from open to closed:

> In response to the risks of law enforcement, open markets tend to transform into closed markets where sellers will only do business with buyers they know or with buyers for whom another trusted person will vouch. The degree to which markets are closed–the barriers of access put in the way of new buyers–will depend largely on the level of threat posed by the police. Intensive policing can quickly transform open markets into closed ones.

Consistent with this assessment, Curtis, Wendel and Spunt (2002) and Andrade (1999) report that street sales almost disappeared from the Lower East Side of New York, partly because of police pressures.

Rengert, Ratcliffe and Chakravorty (2005) also present evidence that dealing moved to indoor locations when police cracked-down on outdoor markets.

However, drug markets are in fact remarkably agile and enforcement impacts may in fact be more varied and subtle than the open/closed paradigm suggests. For example, as enforcement pressure increases sellers may increase the use of intermediaries like runners or steerers guiding buyers to different locations for the purchase (Mieczkowski, 1986; Maher and Dixon, 2001); they may change the type of location utilized for sales from more open air venues to different though still public venues (store or bodegas); or they may remove themselves entirely from the market place for a short period of time, waiting then returning to business as usual (Curtis and Sviridori, 1994) Sellers may also increase the use of technology (cell phones, the Internet) to reduce risk and maintain customers or make fewer, larger sales to a smaller circle of customers (Aitkin et al., 2002; Caulkins and MacCoun, 2003).

Although the Harocopos and Hough hypothesis is reasonable and has some empirical support, it is not necessarily compelling. Effective law enforcement may disrupt stable buyer-seller relationships either by removing the seller from the market or by removing the venue through which buyers and sellers normally interact. Thereby enforcement may actually promote open markets, as buyers and sellers are continuously forced to forge new market relationships.

The effect on markets may depend on how enforcement attacks distribution. As noted by Harocopos and Hough, street-level enforcement may force buyers and sellers to take the precautionary step of moving transactions from public to private settings. In contrast, by causing no enhanced threats of arrest and prosecution in retail markets, higher-level enforcement provides no strong incentive to abandon efficient (public) dealing. Indeed, by disrupting extant supply chains, higher-level enforcement may force buyers to *abandon* their regular sources (who have no drugs to sell) in search of new sellers who still have access to ongoing sources. Harocopos and Hough's observations notwithstanding, higher-level dealing may in fact increase the openness of illegal drug dealing.

When we began this research, we anticipated that the paradigm of open and closed markets would be a useful way to characterize market activity, and while this is undoubtedly true for some purposes, we discovered that behaviors regarding who buyers contacted, how they contacted them, and where they purchased their drugs did not conform neatly to the open/closed paradigm. First, the terms open and closed lack clear operational definitions, so it was difficult to clearly characterize the ADAM market questions with respect to how they reflected behavior in open or closed markets. Second, and more importantly, we found that targeted law enforcement has no consistent affect on opening or closing markets. We have abandoned the theoretical perspective that targeted law enforcement causes illegal drug markets to be more or less open.

The Technology of Drug Dealing

Police increase the cost of buying and selling drugs. As noted above, beyond increasing costs, police may cause drug markets to privatize, moving from public dealing to private dealing, with transactions being facilitated by the advent of technology in the form of beepers, cell phones and computers (Andrada, 1999; Curtis, Wendel and Spunt, 2002).

There is an issue of causality, however. Policing may force buyers and sellers to privatize transactions, and surely technology promotes this privatization. Nevertheless, phones and computers are not unique to drug dealing – they are ubiquitous in society. Causation would be difficult to untangle. In interviews

with sellers and users in London, May and colleagues (2000) found that over the prior 5 year period there had been an increase in the use of cell phones (particularly the "pay as you go" variety) and pagers that greatly reduced the need for open market sales that had previously characterized drug dealing. Whether the new technology was in response to enforcement or unrelated societal changes is unclear, but like the rest of society, the retail market became more high tech. We are unaware of any reduction in arrests because buyers and sellers have adopted cell phones and computers, so technology may facilitate drug transactions, but it does not appear to be a strong protective measure (see Andrade, 1999).

A study by Rhodes, Kling and Johnston (2007) provides some confirmation. They estimated the arrest rate during a one-year window prior to the arrest that caused a drug user to enter into the ADAM sample. After controlling for the extent of drug use and other factors, the authors reported that knowledge or whether the most recent transaction was private or public explained little about arrest frequency across thirty-eight counties.

When we describe drug market behaviors, we will describe the means that buyers use to contact sellers. Sometimes this is by face-to-face encounters, but often it is by using electronic communication including beepers and cell phones. For reasons already explained, we are uncertain that the use of electronic communication greatly improves the privacy of transactions, and we are even more uncertain that the use of electronic communication will be sensitive to the availability of illicit drugs. Using ADAM data, we can learn something about the use of cell phones and beepers to contact sellers, so how targeted enforcement affects the use of electronic communication technology is an empirical question.

Price Setting in Illegal Drug Markets

All suppliers face a production cost and they sell their product with the intent of recovering that cost plus some profit. The size of the profit depends on the competitiveness of the market, and perhaps, the supplier's ability to take advantage of temporary shortages. In the face of shortages, prices increase so that the demand at that higher price meets the limited supply.

Price setting in illegal drug markets occurs differently than price setting in most other markets. Because drug dealers can dilute their product, suppliers may reduce quality (principally purity) rather than increase the nominal prices (price per bulk gram of cocaine, for example). Of course as quality falls, the real prices (price per pure gram of cocaine, for example) increases (Rhodes and Hyatt, 1994; Caulkins et al. 2004).

Studies of the elasticity of demand for illegal drugs report that buyers react to changes in the real price of drugs (Rhodes et al., 2000; National Research Council, 2001; Grossman, Chaloupka and Shim, 2002). These findings pertain to initiation (first-time use of an illegal drug), participation rates (whether or not someone uses an illicit drug) and frequency of use. For example, a price elasticity of –1 (which is within the range reported by some researchers) means that a 10% increase in the price of drugs leads to a 10% decrease in the use of drugs. The expenditure of drugs remains the same, however, because the increase in price offsets the decrease in consumption. Elasticity between 0 and –1 would result in a reduction in use but not an actual increase in expenditures.

An illustration may be useful. Suppose that the price of cocaine increased to 10 percent above average during the month prior to the interview. By spending $10 on a rock of crack during that month, a user would receive 10 percent less cocaine that he would on average. He would, however, receive exactly

the same size rock of cocaine than he would on average. If he spent his normal $200 per week during that month, he would consume 10 percent less *pure* cocaine but exactly the same *bulk* cocaine. While real consumption would fall, reported consumption would remain constant, and the probability of a positive urine test would not much change. Of course, he may switch to other more readily available drugs, or he may spend more on competing goods. But if he does not, observable consumption (reports of purchases of bulk cocaine and urine test results) will not reflect reduced consumption of *pure* cocaine.

Furthermore, drug users may not react to prices so much as they react to availability. Inexperienced users especially may exit from a market because their inexperience hinders their finding sellers. They may be willing but unable to spend money on lower quality drugs. So just how enforcement affects expenditures on drugs is an open question.

Borrowing on the literature regarding illegal drug prices, we estimate retail prices for cocaine, heroin, marijuana and methamphetamine. These estimated prices entered into our analysis of market behaviors, because we sought to learn how purchase decisions varied with targeted enforcement holding constant the effectiveness of source country and interdiction activities, which also hold the prospect of affected local markets (Layne et al., 2001).

What Can Police Do about Drug Markets?

Much routine police activity is reactive; that is, officers respond to crimes as they occur rather than being deployed proactively into areas where certain criminal activity like drug dealing is concentrated. Throughout the 1980s and 90s, with the advent of the vigorous crack trade in many inner city areas, police initiated more proactive initiatives to deal with drug crimes. These approaches include initiatives to coordinate local community responses such as Crime Stopper Programs, citizen hotlines, and tenant patrols in public housing (Fagan , Davies and Holland 2005). Law enforcement also utilizes special multi-agency drug task force initiatives or specialized units within a department focusing on market disruption like abatement teams working to close drug houses (Lurigio et al., 1998).

Traditional enforcement efforts involve buy/bust operations, sting operations and crackdowns or intensified arrest efforts. All are designed to make buying and selling more difficult, risky or generally unattractive; decrease the connection between buyer and seller; decrease the amount of product available through seizures or removal of sales agents; and meaningfully raise the price to discourage use. Some efforts like street sweeps or regular patrol of dealing areas are part of the routine police activity of an area and for our purposes will not produce an observable change in market activity. On the other hand we would expect major initiatives or citywide crackdowns to produce a discernible effect.

There is considerable debate in the police research community as to the effectiveness of crackdowns and other focused efforts on disrupting the market and what an apparent effect actually means (Reppetto, 1976; Eck, 1994). Effects can include a displacement of the market to another area (Fuller and O'Malley, 1994; Kleinman, 1987), a change in consumers, a change in the timing of activity, a change in the perpetrators and a real change in the overall volume of market activity. Research shows each of these impacts. For example, Operation Pressure Point (OPP) was a coordinated police effort to "take back the streets' in the mid 1980s in an area of New York City that was overrun with open air drug dealing. OPP added 240 new police officers to the area --- arresting dealers and users, issuing parking tickets to disperse crowds and move traffic, participating in hundreds of buy/bust operations

over a several month period. Zimmer (1990) reported a variety of consequential changes in the market: dealers varied their locations for sales including moving some sales to other parts of the city; there were fewer street sales, greater use of intermediaries (steerers), larger quantities sold and fewer "drive by" sales, i.e., out of area buyers. There also appeared to be a reduction in robbery and property crime in the targeted area. Other research has found declines in offense reports and calls for service as a result of targeted enforcement efforts such as OPP (Weisburd and Green, 1995) but the effect appears transitory (Sherman and Rogan, 1995)

Curtis and Sviridoff (1994) report that the impact of the deployment of the NYPD Tactical Narcotic Teams (TNT) into Brooklyn to break up retail crack markets resulted in different effects in different areas of Brooklyn based on the organization of the market prior to the intervention. In some areas (Williamsburg) there was a dramatic change in the market as family operated dealing organizations pulled out the area to "wait out" the intense police activity. In other areas like Bushwick and Flatbush there was less displacement but the market changed in the way that it functioned --- dealers moved inside, there were fewer stranger sales and the market became more diffuse. In short, the TNT effort primarily had "an impact upon patterns rather than quantity of dealing, with some markets moving from the street to indoors, and certain locations experiencing an increase and others a decline in activity" (Jacobson, 1999:11).

In a more recent study, Fagan, Davies and Holland (2005) looked at the impact of a large-scale law enforcement effort focused on 184 public housing projects in New York City in an attempt to eliminate drugs in public housing. This initiative included a doubling of police presence in housing project areas (Operation Safe Homes) and the use of special prosecution teams to evict drug dealing tenants (Anti-Narcotic Task Force) as well as local tenant patrols and drug education efforts. Results showed an effect on the amount of property and violent crime at the precinct and census tract level but no effect specific to the housing projects themselves.

Still, there is a distinction between enforcement at the retail level and enforcement at higher levels of the distribution chain. There is not much research investigating the effectiveness of enforcement delivered at higher distribution levels. Layne et al. (2001) demonstrated that source country interventions and interdiction affect prices at the border and ultimately retail prices and demand. The affect on prices is ephemeral as traffickers adjust to enforcement. A study by Weatherburn and colleagues (2001) provides a unique opportunity to look at the effect of a serious disruption in the heroin market, in this case caused by a combination of five years of heavy seizure activity and a drought in the growing area of the primary source country (Burma). In a 2-3 month period in 2000-2001 an Australian heroin "drought" produced a large abrupt change in heroin prices and a severe shortage of heroin on the streets of urban areas. Self-reports of street buyers indicated an impact on the retail market. Users reported that the shortage reduced the purity of what was available, decreased their overall expenditures on heroin, increased their search time, decreased their heroin use and increased their drug substitution.

Overview of the Literature and Study Questions

While there is considerable variation in the impact of the many law enforcement efforts on retail markets, one theme is fairly constant: retail markets are highly adaptive. They may change venue, customer and/dealer pool, technology involved and visibility. ADAM data provide a limited window into the nature of those changes as they systematically reflect the activities of the buyers and sellers of the markets.

As noted in the literature review, we are agnostic about the level of organization required to distribute drugs at the wholesale level. We simply pose the question: Does the disruption or breakup of large criminal organizations have a material effect on local drug markets? We will judge a "material effect" by both the magnitude and duration of the disruption. An effect could emerge regardless of how local markets are organized. If they are vertical and structured, then dismantling the organization will reduce drug availability until the dismantled organization is replaced. If they are atomistic, but if one or a few organizations are principal suppliers, then dismantling the supplier will interrupt the market until new suppliers emerge. If the entire network of traffickers is atomistic, of course, we would expect the breakup of a putatively large organization to have little discernable effect on market operations.

One general research question asks how targeted enforcement activities affect the characteristics of market transactions. ADAM cannot tell us all we would like to know about market behaviors, but it provides sufficient detail that we can correlate targeted enforcement activities with self-reports of the market transaction immediately prior to the ADAM interview, thereby testing:

- Did targeted enforcement increase or decrease the probability that the buyer purchased from a known source?
- Did targeted enforcement increase or decrease the probability that the buyer contacted the seller though relatively private means (such as a known telephone number) or through public means such as going to a public park?
- Did targeted enforcement increase or decrease the probability that the buyer would make the purchase in a relatively private setting (such as the buyer and seller's home) instead of in a public setting such as a park?
- Did targeted enforcement increase or decrease the probability that the buyer purchased the drug in his own neighborhood.

We originally attempted to build on Harocopos and Hough's perspective on open and closed markets, but this perspective is difficult to operationalize, and surely these four measures are not good reflections of openness/closeness, so we abandoned that perspective. We simply ask: Did targeted enforcement change the way that drug buyers participated in drug markets?

Whatever the adjustments to market participation behavior, we presume that they stem from a temporary shortage of drugs resulting from targeted enforcement that removed organized dealers, that removed the drugs transacted by organized dealers, or both. Given that the real price increases from reducing the purity of the drug while holding nominal prices and bulk quantity constant, a second general research questions asks:

- Did targeted enforcement reduce the purity of drugs sold in illegal drug markets?

To answer this question, we had to use data from the System to Retrieve Information from Drug Evidence because ADAM does not report the purity of drugs exchanged in market activity.

A third general question asks how targeted enforcement affected the use of illegal drugs among arrestees and how much they spend on illegal drugs. Specifically:

- Does targeted enforcement reduce the probability of using drugs within two or three days of being arrested? The two to three day period is the criterion because urine test results (included as part of the ADAM interview) provide a reliable means to ascertain drug use within the last two to three days.
- Does targeted enforcement reduce the frequency of self-reported drug use during the 30 days prior to being arrested?

- Does targeted enforcement reduce the average expenditure on illegal drugs?

Answering these questions requires suitable data. The next section describes data source including the ADAM interview data, the source of price-purity data, and the source of enforcement data.

2.0 Data

This section describes ADAM market data. ADAM was sponsored by the National Institute of Justice from 2000 through 2003. A total of 41 counties participated in the ADAM survey, including a few counties that self-financed their own participation. ADAM is not a probability sample of counties, but within a county, it is a probability sample of jails within that county, and a probability sample of bookings within each jail. ADAM was administered quarterly, although not all counties participated in every quarter of data collection. Each quarter of data collection typically required sampling and interviewing over a two-week period, during which time a sample of arrestees were interviewed about their drug use and market behaviors and tested for recent drug use using a voluntary urine sample. Interested readers should consult Hunt and Rhodes (2001) for details.

This section also describes how we assemble law enforcement data. Our source was a comprehensive review of newspaper accounts. We attempted to verify those newspaper accounts with local police, but we were only able to do that in four counties.

Additionally there is a brief discussion of the System to Retrieve Information from Drug Evidence. STRIDE records purchases and seizures of illegal drugs by federal agents and by some state/local police. The data are especially useful because routine laboratory analysis tests the purity and STRIDE reports the purchase price and location of purchases. Readers seeking more detail should consult Rhodes, Johnston and Carrigan (2000).

We had sufficient resources to study enforcement in ten counties. We selected those ten counties that appeared to have the richest ADAM data using two principal criteria. First, these counties came the closest to reporting quarterly ADAM data over the entire four-year period; other counties had gaps in the time-series of reports. Second, these counties have comparatively high prevalence of cocaine, heroin and methamphetamine use. Although Western counties predominate, we do not expect markets in these ten counties to react differently to enforcement than would markets in other counties represented by ADAM. Furthermore, we seek to demonstrate whether ADAM data are useful at capturing market changes in response to targeted law enforcement; we do not expect the changes to be the same everywhere, and we do not intend for law enforcement in these ten sites to represent the effect of targeted law enforcement elsewhere.

2.1 Market Data from ADAM

Our analysis of market behaviors depends importantly on four survey questions about source, method of contact, place of purchase, and neighborhood of purchase. An intermediate objective is to recode responses to these questions to facilitate the analysis. We also construct an expenditure variable and a price variable, both of which enter the analysis. The following subsections:

- Introduce the reader to the four market variables – source, contact, place and neighborhood – and explain how we coded those variables;

- Explain the derivation of the expenditure and price variables, and
- Identify non-market variables taken from ADAM that also enter the analysis.

Technical appendices detail statistical methodology.

Four Market Questions

The ADAM interview asks respondents about their last cash-based transaction provided the transaction had occurred within one month of the interview. One question asks: *Is the person you bought it from:*

1. *Your regular source;*
2. *An occasional source; or*
3. *A new source for [name of drug]?*

This question is repeated for each type of drug purchased during the last month.

When there is ample supply of a drug on the street, we would expect buyers to purchase from a regular source, because this is an efficient way to buy drugs (by minimizing search time) and because this is the least risky way of purchasing drugs. When drugs are in short supply, a buyer is more likely to find that his regular source has nothing to sell, and he would have to search for a new source. Thus, the allowable responses form an ordering, so that the probability of answering "regular" source is less likely following targeted enforcement, and the probability of answering "new source" is more likely following targeted enforcement. Answering an "occasional source" is an intermediate answer. This defines the **SOURCE** variable, which we will use below.

The interview asks the respondent: *The last time you bought [name of drug], how did you contact the person you bought it from:*

1. *Call the person on the telephone and speak with the person directly*[1]*;*
2. *Go to a house or apartment;*
3. *Approach the person in public such as on the street, in a store, or park; or*
4. *Were you with the person already at work or in a social setting?*

The interview also allowed a response of "other" but we have excluded those infrequent responses in this study. They are treated as missing. For the subsequent regression analysis, we used statistical analysis[2] reported in appendix 1 to collapse the method of contact variable into the **CONTACT** variable, with two categories:

1. Page, telephone or go to a house/apartment.
2. Approach the person at work, in a social setting, or in a public setting.

The interview asks: The last time you bought [name of drug], at what type of place did you get it:

[1] The interview provides for an additional response: *Page the person on a beeper*. There appears to be little difference between paging a person (which requires a telephone response) and calling a person on the telephone. Consequently, we have merged these categories.

[2] Briefly, we treated responses to the SOURCE variable as a definitive indication of the transaction being closed (regular source) or open (new source). We then regressed the other three markets questions (one at a time) onto the SOURCE variable using multinomial logistic regression. Based on the results from these regressions, we ordered the responses to the other three market questions from closed to open.

1. *In a house or apartment;*
2. *In a public building such as a store, bus station, gas station, or restaurant;*
3. *In an abandoned building;*
4. *On a street, alley, or road; or*
5. *Other outdoor area?*

Again, we treated as missing the few observations that provided the response of "other." Some of the retained outcomes were relatively rare; therefore, we recoded the retained responses into similar categories, combining categories 2 and 3 and combining categories 4 and 5. The new categories comprising the **LOCATION** variable are:

1. In a house or apartment
2. In a public or abandoned building
3. On the street or in another outdoor area.

Finally, with respect to variables that reflect market behavior, the interview asks: "Did you buy it:

1. *In the neighborhood where you live; or,*
2. *Outside your neighborhood?*

This is the **NEIGHBORHOOD** variable.

We have attempted to order variables from transactions that require some familiarity between the buyer and seller and those that do not require much familiarity. As already noted, these variables do not necessarily capture what others have identified as open and closed markets, but putting them in an order allows us to apply order logistic regression in the analysis. Other researchers might prefer to treat the categories as nominal, perhaps using a multinomial logistic regression to analyze the data. Of course, treating the variables as nominal only matters for two of the variables, as the other two are binary. We have not investigated whether treating these variables as nominal would alter any conclusions.

Table 1 provides a raw description of these four market variables by county (10 counties) and by type of drug (crack, powder, heroin, methamphetamine and marijuana) before collapsing. The table provides the unweighted percentage distribution across the response categories and the number of observations for the source question.[3] Except for a few missing and other responses, the number of observations does not vary much across the four market questions holding county and drug constant.

[TABLE 1 HERE]

Briefly, inspecting Table 1 shows that certain types of drug abuse is uncommon in some of the ADAM sites, and when that is the case, information about market behavior is unreliable or altogether absent. Most notably, few respondents reported purchasing methamphetamine in New York and Denver; few reported purchasing powder cocaine in Sacramento and San Diego.

Additionally, Table 1 shows wide variation in market structures across these ten locations. For example, somewhat more than 60 percent of buyers purchased crack cocaine from regular sources in Phoenix and Salt Lake City, compared with about 40 percent of crack buyers in Sacramento and San

[3] Although the tabulations are unweighted, the ADAM sampling procedure attempts to provide roughly equal weights for all arrestees within an ADAM site. Weighting makes little difference for tabulations. We elected against using weights because the regression analysis reported in the rest of this paper was based on unweighted data.

Diego. About 22 percent of crack buyers contact the dealer by phone or pager in Phoenix and Sacramento, while the same is true for 44 percent of the crack purchases in Portland and 63 percent of the crack purchases in Salt Lake City. A house or apartment is the location of the purchase in 30 to 36 percent of crack purchases in Denver, Portland, San Diego and San Jose. In contrast, a house or apartment was the location in about 64 percent of purchases in Phoenix and in 63 percent of purchases in Salt Lake City. Fewer than 30 percent of purchases were within the buyer's neighborhood in San Jose; more than 50 percent were within the buyer's neighborhood in Denver and Phoenix.

The above description excludes New York City (Manhattan) because responses from New York City seem anomalous compared with the other nine locations. Using crack cocaine as the illustration, we see that New York buyers rarely (8%) purchase from a new source. New York City buyers almost always (83%) approach the seller in public, and the purchase almost always (85%) occurs in a public place. New York City crack buyers typically (61%) purchase within their own neighborhoods. New York City drug markets appear to be remarkably different from drug markets in other places. Furthermore, the sketch provided here differs qualitatively from the description of New York City markets provided by Curtis, Wendel and Spunt (2002) and Andrade (1999) – albeit those descriptions are from an earlier time. This does not mean that there is something wrong with the New York City data; it merely implies that markets in New York are different from markets in the other nine counties – each of which is from the western part of the United States.

The markets differ by drug. In 9 of 10 counties, heroin buyers were more likely than powder cocaine buyers to purchase from a regular source. In 8 of 10 counties, powder cocaine buyers are more likely than methamphetamine buyers to purchase from a regular source. In 8 of 10 counties, methamphetamine buyers are more likely than crack buyers to purchase from a regular source. Crack and marijuana buyers are about equally likely to purchase from a regular source. If purchasing from a regular source is indicative of a relatively private transaction, then there is a rough ordering from public to private transactions running from crack/marijuana (most public) to methamphetamine to powder cocaine to heroin (most private). The relative public nature of crack sales agrees with observations by Jacobs (1999) and Buerger (1992); but the findings about the comparative public nature of methamphetamine markets contradicts the findings reported by Eck (1995), Pennel et al. (1999) and apparently Rodrigues et al. (2005). Perhaps the difference between our findings and those of Eck and Pennel are explained by changes in the market, as their findings predate the 2000-2003 data; or, the difference might occur because of the way that we have operationalized the definitions of public and private. We used the same data as were used by Rodrigues for Phoenix and Tucson, but we compare methamphetamine markets with other drug markets, concluding that methamphetamine markets are not necessarily more private than are other illegal drug markets. Had Rodrigues compared market behaviors for methamphetamine users with market behaviors for other drugs users, her conclusions likely would have agreed with our conclusions.

The literature review alerted us to expect that markets would vary across places and by type of drug, and the evidence is consistent with that expectation. Given the variety of market structures, we would not be surprised to observe considerable variation in how targeted law enforcement affects these different markets. Before turning to that matter, however, we identify some additional variables that will enter the analysis.

Identifying Additional Market Variables

The ADAM interview offers two more variables that *potentially* reflect how targeted enforcement affects illicit drug markets:

DEALERS Respondents are asked:

In the past 30 days, how many different people did you buy from? Call this D.

Respondents are also asked:

On how many of the last 30 days did you buy the drug? Call this M.

Then DEALERS is the ratio D/M. We would expect this ratio to be smaller when drug supplies are ample, because buyers would tend to buy from established sources when those established sources can provide the desired drug. There is a problem with this variable, however. The variable is necessarily 1 for respondents who purchased just once. Furthermore, interpretation is complicated, because frequent buyers may have multiple "regular" sources. Given the interpretive problems, we decided not to use this variable in the analysis.

THWARTED Respondents are also asked:

Was there a time in the past 30 days when you tried to buy [drug] and had the cash but you did not buy any?

This question, too, has some problems when applied for our purposes. The probability of being unsuccessful increases as a power function of the number of attempts. Suppose that the probability of being successful on any given attempt was P. Suppose there were A attempts. Assuming independence across attempts, the probability of being unsuccessful on at least one attempt is $1\text{-}P^A$. Given interpretive problems, we decided not to use this variable in the analysis.

EXPENDITURES is another measure of market activity, but the assembly of an expenditure variable requires multiple steps, which we explain here. (For details, see Rhodes et al., 2005.) If a respondent says that he bought drug X during the last 30 days, then he is asked:

CASH *How much cash did you pay for [drug] the last time you bought it?*

TIMES *How many times did you buy [drug] on the same day?*

DAYS *On how many of the past 30 days did you buy [drug]?*

Presuming that the last purchase was typical of other purchases, CASHxTIMESxDAYS is a preliminary estimate of expenditures during the last month. This is a preliminary estimate – and requires adjustment – for two reasons. The first reason is that the buyer did not necessarily buy the drug for his own use. That would be no problem for present purposes, except some of these buyers are actually buying for resale. ADAM asks the buyer:

OWN *How much of the [drug] you bought was for you to use yourself? This is expressed as a percentage.*

The first adjustment to the expenditure estimate is to change the computing formula to

EXPENDITURE =CASHxTIMESxDAYSxOWN

This adjustment has the advantage of eliminating extremely large values from the estimates. Additionally, we trimmed responses that remained extreme. (See Rhodes et al., 2005.)

The second adjustment is more difficult. Users often acquire drugs without making a cash payment, and when that is the case, we imputed a dollar value to the transaction. Whether the user acquired the drug with cash or otherwise, he is asked the question with respect to the last acquisition.

UNITS *How much [drug] did you [acquire] that last time (in units)?*

TYPE *How much [drug] did you [acquire] that last time (by type of unit)?*

When we had cash transactions, we could compute the average dollar expenditure per units purchased. This allowed us to impute the cash-equivalent value when there was no dollar exchange. We used imputed values as if it were an actual cash transaction.

We used the EXPENDITURES variable in our analysis. This is an unbiased estimate of expenditures conditional on the number of purchases made during the last month. But as an estimate of expenditures during the month, it may have a high sampling variance. To illustrate, consider two buyers. The first said that he paid $100 for the last purchase, bought once that day, and bought twice during the month. The second said that he paid $10 for the last purchase, bought once that day, and bought twice during the month. The first spent an estimated $100x1x2=$200 during the month; the second spent an estimated $10x1x2=$20 during the month. Of course the $200 may be too high for the first buyer if that last purchase price was abnormally high, and the $20 may be too low for the second buyer if his last purchase price was abnormally low. But if the first buyer represents 50% of those who bought twice during the month and if the second buyer represents the other 50%, then $110=($220+$20)/2 is an unbiased estimate of average expenditure for those who bought twice during the month.

Additional ADAM Variables

As noted earlier, an urban area can have multiple drug markets, and it seems reasonable to assume that participation in a specific market may depend on the buyer's characteristics. We necessarily limit our analysis to purchasers by men, so gender is constant throughout the analysis, but ADAM provides other measures of buyer characteristics:

EXPERIENCE Experienced buyers may participate more often and in different markets than do inexperienced buyers. One imperfect way to measure experience is to use an additional ADAM question:

On how many of the past 30 days did you buy [drug]?

One problem with this measure is that it may be endogenous.[4] To deal with that possibility, we regressed the answer to the question about purchases during the last 30 days onto reports of drug use during the last eleven months, which were reported on a month-by-month basis with the response categories:

0. None
1. 1 day per week
2. 2-3 days per week
3. more than 3 days per week

There were six separate regressions. We used the predictions from these regressions as a measure of experience at purchasing illegal drugs. Note that EXPERIENCE has a value for everyone who used the drug sometime in the last year, regardless of whether or not they made a purchase in the last month.

That this variable measures experience presumes that experience increases with the frequency of purchasing because this yields a causal interpretation. But the assumed relationship between experience and frequency of purchasing may be wrong. Readers may prefer to interpret the EXPERIENCE variables simply indicating the frequency of purchasing a drug.

This experience variable will serve an additional role in the analysis. We will argue subsequently that by reducing the availability of illegal drugs, enforcement may reduce the number of more casual users, who have limited ability to adapt their market behaviors. If they purchase less frequently, then the average experience level of those who do purchase (and appear in an arrestee cohort) will increase. This is testable using the data at our disposal.

AGE Holding experience constant, we are uncertain that older buyers will be more informed about illegal drug markets than younger buyers, but it seems plausible. Note that almost all respondents are adults because juveniles are typically held in facilities not included in the ADAM survey.

ETHNICITY It seems plausible that markets are differentially available to buyers based on race/ethnicity since some markets are known to operate through social networks. We code race/ethnicity as:

1. White
2. Black
3. Hispanic
4. Other

[4] We seek to use this variable as a measure of buying experience. However, during the month before the interview, the experience may have been anomalous as the respondent had to deal with market shortages. Therefore using the prediction from the past eleven months that predate the last month helps deal with this endogeneity, although it does not cause it to disappear because the shortages may have begun several months in the past. Even if that were true, however, EXPERIENCE would represent the buyers experience during the recent past, which may be the best measure of current experience.

EDUCATION It seems plausible that market participation varies with social and economic standing. ADAM has no markers for social/economic status, but two variables seem pertinent. The first is education, coded as:

1. No degree
2. High school or GED
3. Some college or two-year degree
4. Four-year degree

EMPLOY A second social/economic standing variable is employment. We coded employment into the following categories:

1. Working full time including active military status.
2. Working part time
3. Not working, including:
    a. Have a job but out due to illness, leave, furlough or strike
    b. Seasonal work, but not currently
    c. Unemployed
    d. Homemaker, in school, retired or disabled

2.2 Drug Prices

Drug price data come from the System to Retrieve Information from Drug Evidence (STRIDE). The Drug Enforcement Administration provided an updated STRIDE file for purposes of this study. We estimated retail drug prices by regressing a dependent variable (pure grams purchased) on a set of independent variables (price paid, quarter of the year, and MSA) for all MSAs providing data for purchases between $10 and $200. We refer readers seeking details for this methodology to Rhodes, Johnston and Carrigan (2000). These regressions (one for each of the drugs) led to our prices variables:

PRICE PRICE is the predicted price from the above regression evaluated for the quarter and ADAM county (MSA).

PRICE is not the local price of drugs. Rather, it is a composite of drug prices from across the nation. The presumption is that a high PRICE indicates a relative shortage of the drug in the nation, presumably because of effective interdiction. The argument is most persuasive for cocaine and heroin, because these drugs necessarily have foreign sources. The argument is less persuasive for methamphetamine, for which there are local sources, but Mexican sources may supply an appreciable amount. The argument is strained for marijuana, for which there is no national market, but Mexico may be a major supplier of marijuana in a border state. We explain the derivation for this variable in an appendix.

We will introduce an additional price variable later in this report that captures county-specific variation in prices. To avoid confusion with the current price variable, we will defer discussion of the derivation of that local price variable until later.

2.3 Police Data

Unlike more formally collected data sources (e.g., arrests, convictions), information related to law enforcement activities are not routinely collected, documented, or reported. Collecting this type of historical information directly from law enforcement agencies with an acceptable level of accuracy would have been extremely time consuming and difficult. (The two principal problems are that police do not maintain readily accessible records and we could not assure that they would cooperate with our study.) Therefore, we searched newspaper archives to obtain comparable data and, in some cases, to "reconstruct" past events utilizing alternative sources of documentation. This allowed us to corroborate and build on what was learned through conversations with local law enforcement, rather than relying on local police to develop the history.

Search of Newspaper Archives

We assembled a history of drug enforcement activities that may have impacted local drug markets by a search of newspaper archives for the primary newspaper in each of the counties. Despite the possible limitation of this approach (i.e., reporting would reflect what local media markets decide to report), the search allowed us to obtain relevant information not readily available that would have been prohibitively costly and time consuming to obtain through other means (i.e., directly from law enforcement agencies). Furthermore, discussions with police caused us to conclude that the search had identified all or most major enforcement events.

The same search process was used for each study site. First, we identified a specific daily newspaper for each site, based on circulation/readership rates. Second, we completed internet-based newspaper archives searches using LexisNexis for the time period of interest (1999-2003) based on six search terms. Third, we reviewed abstracts for all articles identified through the search. Fourth, full articles were reviewed for articles identified as potentially relevant to the study based on the reviews of abstracts. Fifth, events described in articles were identified as potentially having a direct versus indirect impact on local drug markets. And finally, relevant information on each event was entered into a database for analysis. A full description of the search process is included in Appendix 2.

Follow-up Interviews with Local Law Enforcement

The newspaper archive search enabled us to develop a profile of law enforcement activities for each study site. We supplemented this information with information (procedural and organizational changes) identified through local department and state websites, as well as events identified through regional and state task force websites, where available (some websites include press clippings or other types of reporting on successful operations). The profiles created were used as a foundation for follow-up phone calls with local law enforcement agencies. Although the purpose of these calls was primarily confirmatory, we also used the opportunity to discuss the market descriptions based on ADAM (Arrestee Drug Abuse Monitoring) program data. Appendix 2 describes the process used to arrange interviews and sites where interviews were successfully conducted.

Unfortunately, police agreed to review our newspaper account in only 4 of the ten sites. We were encouraged that the police agreed with newspaper accounts in those settings, and we presume that police would have agreed with newspaper accounts in other settings had the police responded to our request. The Drug Enforcement Administration reviewed the list of enforcement events, but

unfortunately, was not able to respond in time for us to include their comments in the analysis file (June 1, 2007). Eventually DEA told us that DEA agents had participated in only 86 of 214 identified events, and only in a support capacity. This was because DEA generally targeted trafficking organizations with international, national and regional impact.

Data from the DEA Website

We also identified large-scale drug enforcement operations as reported by the DEA on its website: http://www.usdoj.gov/dea/major/major.htm. This was the only source of enforcement data for New York, because we lacked the resources to perform newsprint searches in that site. (The DEA web site likely misses targeted enforcement events that lacked DEA participation.) If we judged the operation to have had the potential of disrupting or otherwise affecting a drug market in any of the ADAM counties, then we quantified information for the event. We only looked at disruptions that were related to cocaine, heroin, methamphetamines and marijuana. Disruptions could include large seizures or the arrest of major participants in the drug's production, transportation or distribution. The information that we were primarily concerned in ascertaining was the drug type affected by the operation, the quantity seized, the price equivalent of the drug seized and the number of arrests made.

Summary of Enforcement Data

Figure 1 summarizes the enforcement data. The figure shows ten time-lines, one for each of the sites. Major enforcement events appear at the times when the police made arrests/seizures rather than during the course of the investigation. Crack and powder cocaine are denoted with C, heroin with H, methamphetamine with Me and marijuana with an M. Sometimes an event involves more than one drug.

Targeted enforcement events are sparse. For example, Tucson had two major events regarding cocaine – one during 1999 and the other at the beginning of 2002. There were no other Tucson-related targeted enforcement events for other drugs. Salt Lake City had three major targeted enforcement events regarding cocaine – but all three occurred toward the end of the ADAM survey data, so it seems unlikely that three targeted events would explain much about cocaine market activity in Salt Lake City. Because targeted enforcement events are infrequent, it is possible that we had to eliminate an ADAM county from the analysis for a specific type of drug – there were simply no enforcement events to study. The extent of this problem will be revealed when we turn to analysis.

[Figure 1 Here]

Appendix 3 identifies targeted enforcement events entering the analysis. A review of that appendix shows that the events comprise newspaper account of the arrests of drug kingpins and organizational members, the breakup or large distribution networks by the arrest of several transporters/dealers identified as playing a major role in local drug trafficking, and the disabling of organizations known to account for supplying large amounts of drugs.

2.4 Summary of Analysis File

Table 2 summarizes the variables that enter into our analysis. The table is self-explanatory, but a few comments may be helpful. The table is organized by ADAM site and by variable. Sometimes it is necessary to report the variable by type of drug. The table reports the market variables categorized as discussed above. Patterns in these reported statistics parallel patterns discussed when reviewing Table 1, so there is no need for additional discussion.

[Table 2 Here]

We have not previously described the EXPERIENCE variables. Recall that the units are the predicted number of purchases during the last month. The base is everyone who used the drug during the last year, so there may have been no purchases during the last month. Holding the drug type constant, EXPERIENCE varies across the sites. In Las Vegas, Phoenix and New York City crack buyers make an average of more than 9 purchases per month; in Salt Lake City and San Jose the average is fewer than 6 per month. Although we do not report statistical significance for these differences, we do report the standard deviation and the number of observations. The standard error for the estimated mean is the standard deviation divided by the square-root of the number of observations, suggesting that the estimated means are fairly precise, and so most of the substantively meaningful differences are statistically significant. Comparing across drug types, heroin users are more experienced than crack cocaine users (in 12 of 12 comparisons) and crack cocaine users are more experienced than both powder cocaine users (in 12 of 12 comparisons) and methamphetamine users (in 11 of 12 comparisons). Methamphetamine users are slightly more experienced than powder cocaine users (in 9 of 12 comparisons). Tentatively we might say that heroin users are the most experienced buyers, followed by crack cocaine buyers, methamphetamine buyers and powder cocaine buyers. The pharmacological effects of these drugs may explain the ordering; for example, heroin users may simply purchase drugs more frequently given that heroin is often administered multiple times per day. Nevertheless, this would still suggest that heroin users are relatively experienced at operating in drug markets. Probably the maturity of users and markets (heroin being more established and methamphetamine being more recent) partly explains the ordering.

The mean age for drug users does not vary much outside the range of 31 to 33 years. Race/ethnicity varies across the sites, as would be expected given inter-county variation in demographics. The education distribution does not vary greatly over the sites, but there is some variation in employment. Somewhat more than half the arrestees were employed full time in six of the sites. Closer to one-third were employed full-time in two sites.

Looking at enforcement EVENTS, the variable D denotes that there was at least one enforcement events within one-year of the purchase. The variable T is the average time between the enforcement event and the purchase, where T=0 for events that are outside the one-year range. (The reason for setting a limit will be revealed later.) The table shows that in some sites, there were no eligible enforcement events. For example, there were no enforcement events for crack or powder cocaine in Las Vegas. Obviously Law Vegas cannot enter into the analysis of how enforcement events affect crack/powder cocaine markets. In other sites, very few of the purchases had events within the eligible timeframe. Only 5 percent of the powder cocaine purchases in San Jose and only 7 percent of the powder cocaine purchases in Salt Lake City could be associated with eligible enforcement events. These sites will be included in the analysis, but we would not expect them to contribute much

information for hypothesis testing – the standard errors for the parameters associated with the enforcement events would be large.

The lack of EVENTS data is discouraging from a statistical viewpoint. Given that the EVENTS data has little variation, it would be difficult to identify statistical significance even if EVENTS has an impact on market activities. Compounding this difficulty, the EVENTS data have noise in the form of our being unable to distinguish between EVENTS that might be seen as major disruptions of local markets and EVENTS that might be seen as less disruptive of local markets. We attempted to eliminate events that were unlikely to have a material effect on markets, however. Input from police would have been helpful for making this distinction, but it appears that police have no systematic way of collecting or storing such data, and anyway, as noted most police declined to participate in this study.

There is cross-site variation in monthly expenditures. We exclude New York City (because it previously appeared anomalous) and rounded to the nearest $5. For crack cocaine, the average was a low of $335 in San Jose and a high of $750 in Denver. For powder, the average was a low of $120 in Sacramento and a high of $270 in Salt Lake. For methamphetamine, the low was $320 in Tucson and the high was $675 in Phoenix. For heroin, the low was $450 in Salt Lake City and the high was $630 in Las Vegas.

Previously we noted that market structures varied across drugs and over places. Now we further note that market participants differ across drugs and over places. This finding reinforces expectations that reactions to targeted enforcement will vary by drug and place.

3.0 Analysis and Findings

We have defined four variables describing how drug buyers participate in drug markets. Also, we identified buyer characteristics (especially EXPERIENCE) that may make those buyers more or less adept at participating in those markets. Finally, we identified law enforcement events hypothesized to affect markets. In this section, we control for buyer characteristics and test the null hypothesis (specified earlier) that illegal drug markets are insensitive to law enforcement practices.

3.1 Outline of the Analysis for the Four Market Characteristics

Our principal objective is to determine how law enforcement affects drug markets. (Later, we extend this analysis to how enforcement affects prices and participation decisions.) We do this by regressing the four market variables onto the enforcement events after controlling for other factors that are likely to affect market behaviors. These regressions are done separately by type of drug and by county. To explain this approach, we start by formalizing the model.

Y_{ij} We have four dependent variables: SOURCE, CONTACT, LOCATION and NEIGHBORHOOD, where i indexes the dependent variable. For simplicity of notation, call these Y_{1j} through Y_{4j}. The subscript j denotes the j^{th} observation within a county. We suppress a subscript for the county, but this will cause no confusion because the analysis will be repeated across counties. We also suppress a subscript for drugs type, but this should cause no confusion because we repeat the analysis across drug types. For most of this discussion, we can

think of analyzing the four market questions for a single drug (such as crack cocaine) in a single site (such as Tucson).

X_j We have a series of control variables starting with EXPERIENCE and ending with EMPLOY, but also including PRICE, which are captured by a row vector X_j. There is no i subscript, because these same variables appear in each of the four regressions.

We have K enforcement events distributed over time and our principal objective is to determine how those targeted enforcement events affected the drug markets. The chief complexity is that an event that occurred a few weeks before a reported purchase decision will have a different effect than would an event that occurred one or two years before the reported purchase event. We used a *distributed lag model* to estimate how the effectiveness of a targeted enforcement event decreased with time, presumably as dealers adjusted to the market disruption. The model requires that we estimate a large number of parameters, and to simplify the estimation problem, we have assumed that *every targeted enforcement event has the same effect* conditional on drug type and county. Obviously this simplification comes at some cost, and a future analysis with these data might attempt to distinguish event effects by event type. We did not follow this route because we lack detailed information that might be used to distinguish targeted enforcement events, and some simplification was required to reduce the parameter space. To explain this approach, let:

$TIME_{kj}$ This is the chronological time between when the kth event occurred and when the jth arrestee answered questions about market purchases. Time is relevant because we expect the effectiveness of enforcement events to decay with time.

T_{kj} This is the time variable that enters into the regression specification.

$T_{kj} = TIME_{kj}$ if $0 \le TIME_{kj} \le \Gamma$ where Γ is an upper limit

$T_{kj} = 0$ otherwise.

We postulate an upper limit to enforcement effectiveness. This upper limit will be important for the model specification. The enforcement data started on January 1, 1999, so we are ignorant about enforcement events that predated 1999. Given that the ADAM data began in the first quarter of 2000, we cannot use the complete set of ADAM data when Γ >1 year. Thus, we have to assume Γ to determine how much of the ADAM data – if any – must be discarded.

D_{kj} This is a dummy variable, $D_{kj} = 1$ if $T_{kj} \neq 0$ and $D_{kj} = 0$ otherwise.

Then we write the effect from the kth event as:

$$\Delta_{ikj} = \delta_{ik0} D_{kj} + \delta_{ik1} T_{kj} + \delta_{ik2} T_{kj}^2$$

This specification allows the effect from the kth enforcement event to decay with time, perhaps nonlinearly. Note that by setting an upper limit to the TIME variable, we allow the effect to decrease to zero over time, perhaps abruptly.

Given K events, there are 12K parameters (because i=1..4) for every county/drug, and estimating a large number of parameters may be impractical. A simplification is to assume that all events have the same effect, so the effect from the k^{th} event would be written:

$$\Delta_{ikj} = \delta_{i0} D_{kj} + \delta_{i1} T_{kj} + \delta_{i2} T_{kj}^2$$

This could be estimated by introducing $TERM_{ij}$ from [1] into the regression specification [3]:

[1] $$TERM_{ij} = \delta_{i0} \sum_{k=1}^{K} D_{kj} + \delta_{i1} \sum_{k=1}^{K} T_{kj} + \delta_{i2} \sum_{k=1}^{K} T_{kj}^2$$

This simplification reduces the parameter space from 12K to 12 parameters. Consider the kth event. Immediately after the kth event occurs, $D_{kj} = 1$ and $T_{kj} \approx 0$. Thus, immediately after the event occurs, the effect on the ith market behavior is approximately δ_{i0}. At time T, the effect is $\delta_{i0} + \delta_{i1} T + \delta_{i2} T^2$. Depending on the signs of the parameters, this can be positive or negative and can even change signs although a change in signs would be difficult to interpret. Moreover, the total effect is cumulative over all events where $T_{kj} \leq \Gamma$, hence the summations.

There is one more simplifying restrictions. An upper limit on the effectiveness of an enforcement event implies a constraint on the parameters because:

$$\delta_{io} + \delta_{i1} \Gamma + \delta_{i2} \Gamma^2 = 0 \text{ for a given i.}$$

We can solve this restriction for δ_{i2} and substitute the solution into [1], so that $TERM_{ij}$ becomes:

[2] $$TERM_{ij} = \delta_{i0} \left[\sum_{k=1}^{K} D_{kj} - \frac{\sum_{k=1}^{K} T_{kj}^2}{\Gamma^2} \right] + \delta_{i1} \left[\sum_{k=1}^{K} T_{kj} - \frac{\sum_{k=1}^{K} T_{kj}^2}{\Gamma} \right]$$

This reduces the parameter space to 8 parameters. This does not change the interpretation of [1]; the constraint simply provides a more precise way of estimating all the parameters in [1] assuming that the constraint is correct.

Interpreting the δ parameters is still complicated partly because the effect TERM varies with T. Suppose there were just a single event; then there would be no need for the summation terms. Suppose that time were scaled so that Γ=1. Then [2] simplifies and we could estimate the entire impact of the single enforcement event by integrating the simplified equation [2] from T=0 to T=1. The sign of the integral tells us if the enforcement event had a positive or negative impact on average of the period during which the event had an effect. We use this integral when reporting results.

Turning to the regressions themselves, we have to deal with four dependent variables that are either dichotomous or ordinal. Using $TERM_{ij}$ [2], we specify four index functions:

[3] $$Z_{ij} = X_j \beta_i + TERM_{ij} + e_{ij}$$

where e_{ij} is a random error term with a logistic distribution centered on zero. Then:

$$Y_{1j} = 1 \quad if \quad Z_{1j} \le 0$$
$$Y_{1j} = 2 \quad if \quad 0 < Z_{1j} \le \xi_1$$
$$Y_{1j} = 3 \quad otherwise$$
$$Y_{2j} = 1 \quad if \quad Z_{2j} \le 0$$
$$Y_{2j} = 2 \quad otherwise$$
$$Y_{3j} = 1 \quad if \quad Z_{3j} \le 0$$
$$Y_{3j} = 2 \quad if \quad 0 < Z_{3j} \le \xi_2$$
$$Y_{3j} = 3 \quad otherwise$$
$$Y_{4j} = 1 \quad if \quad Z_{4j} \le 0$$
$$Y_{4j} = 2 \quad otherwise$$

We assume that the error terms are independent over j but correlated over i holding j constant. The SOURCE and LOCATION regressions (Y_1 and Y_3) are estimated using an ordered logistic regression; the CONTACT and NEIGHBORHOOD regressions (Y2 and Y4) are estimated using a binary logistic regression.

As noted earlier, other analyst might prefer to treat the outcomes as being measured on a nominal scale rather than an ordinal scale. This has advantage, especially if the ordering is incorrect, which seems unlikely for the SOURCE variable, but might happen for the LOCATION variable. The CONTACT and NEIGHBORHOOD variables are already binary so for them there is no ambiguity about ordering. We prefer to treat these as ordered variables, because doing so reduces the parameter space and in our view the ordering seems justified by the analysis reported in the appendix.

A Complication Regarding Timing

A respondent is asked to report on the market transaction the last time that he purchased the drug in question. We do not know the exact timing of that purchase, although we know that it occurred within the 30-day period prior to his interview, and we know the frequency with which he purchased drugs during the 30-day period. Let:

DAY This is the DAY that the respondent was interviewed.
FREQ This is the number of days during the last 30 days when he purchased the drug.

Then we estimate the day when the purchase occurred as:

$$PURCHASE\_DAY = DAY - \frac{30}{FREQ+1}$$

The logic is that if the respondent made one purchase (FREQ=1), then our best guess is that he bought the drug fifteen days in the past (30/2=15). If he made two purchases, our best guess is that he purchased the drug ten days in the past, and so on.

What Enforcement Events Matter?

Previously we identified targeted enforcement events as those that resulted in seizures of large amounts of drugs, the disruption of a major drug distribution conspiracy, or both. Often the disruption/seizure pertains to a specific type of drug (e.g. cocaine) or to a combination of drugs (e.g. cocaine and heroin). To be used in a regression, the enforcement event had to pertain to the same drug as was the reference for the market questions. If a respondent answered questions about purchasing crack (or powder) cocaine, then the events included in the analysis had to pertain to cocaine in some form.

Estimation

Estimation raises no uncommon problems. We use standard computing software for binary and ordered logistic regression. We estimated the parameter covariance matrix across equations using methods of seemingly unrelated regressions (SUR). We refer readers to standard textbook discussions of SUR, and especially to the discussion in the STATA documentation.[5]

The one difficulty is that we do not know Γ, the maximum period during which an enforcement event can have some effect. A potential solution to this problem was to conduct a grid search over values of Γ using the likelihood as a criterion. Unfortunately, the likelihood is flat over a broad range, so using a grid search was not useful. Instead, we repeated the analysis for three values of Γ: 0.5, 1.0 and 1.5. In parts of the following analysis will simply assume that $\Gamma = 1$.

Statistical Tests

The availability of the cross-equation parameter covariance matrix allows us to use Wald tests of the null hypothesis that the enforcement events had no effect on *any* of the four market variables. This is equivalent to testing the null that $\delta_{ij} = 0$ for all i and j. The test is repeated for each of the ten counties and for each of the five drugs, so there are potentially fifty tests. In fact there are fewer because some county/drug combinations lacked suitable data – either because the specific drug was rarely purchased or because there were no eligible enforcement events.

Each Wald test produces a test statistic that is distributed as Chi-square under the null hypothesis. Thus, given the Chi-square distribution, under the null there is a probability of observing a test statistic that is equal to or smaller than the computed test statistic. We refer to that as the *probability-value* of the test. If there were N tests, then under the null we would expect to observe 0.1N probability-values of 0.1 or less. If we actually observe much more, then we can determine whether the number in excess

[5] Every regression was estimated without regard to the correlation across regressions. This produces consistent parameter estimates and standard errors. The parameter covariances across equations is then based on the scores.

of 0.1N is statistically significant. The probability of observing exactly n (the number of tests exceeding 0.10) significant tests in N tests is:

$$P(n\ significant) = \frac{N!}{n!(N-n)!} 0.9^{N-n} 0.1^{n}.$$

The statistical significance of observing n or more tests under the null results from evaluating and summing this expression from n to N. If the sum is less than a specified value (such as 0.05), then we reject the null hypothesis that enforcement has no effect on market activities.

The statistical tests are useful, but they provide little intuition for how much enforcement matters in changing market behaviors. Graphs are useful. Suppose we start with a baseline 0.5 for a specified market condition just prior to an enforcement event – for example, that the probability of contacting a new source is 0.5. The choice of 0.5 is convenient, and other assumptions would not greatly change the results. The convenience arises because at baseline $e^{\varsigma}/(1+e^{\varsigma}) = 0.5 \quad \Rightarrow \quad \varsigma = 0$. Then we can graph how enforcement affects the probability of contacting a new source by graphing:

$$\frac{e^{TERM}}{1+e^{TERM}}$$

where TERM from equation [2]is a function of time and the range for the function is from 0 to Γ. We will draw such graphs as a method of discussing results.

3.2 Outline of the Analysis for Price and Market Participation

The analysis for market participation parallels that for market characteristics. The differences are discussed below. The first difference is that the dependent variable is a measure of market participation instead of a measure of market characteristics. One set of regressions use market participation as the dependent variable; market participation is a binary variable indicating that the arrestee reported some spending on the drug in question. This regression was estimated using data from all arrestees who said they had used the drug during the last month. A second set of regressions uses total expenditures as the dependent variable. This regression is estimated using all arrestees who said that they had purchased or otherwise acquired the drug during the last month. We took the logarithm of expenditures prior to estimating the regression.

The analysis of prices is entirely different from the analysis of market behaviors, because for prices the dependent variable ESTIMATED PRICE was estimated prices based on STRIDE data and the independent variable was the EVENTS data. Deriving the ESTIMATED PRICE required two steps.

First, we estimate the PRICE variable as already described. Recall that PRICE is our best estimate of how drug prices change across the country presumably in response to successful source country eradication and both intra-county and inter-country interdiction. Second, to derive a dependent variable for the price equations, we subtracted PRICE from the observed price and used the residuals in our regressions.

4.0 Results

The following subsections show that enforcement tends to cause markets to change. The effects are most pronounced for crack and powdered cocaine, but even for those two drugs, the effects might be deemed modest.

Analysis the Market Questions

Given ten counties, five drugs, four market variables, and roughly fifteen parameters per regression, the statistical output is voluminous. We can provide the entire statistical output as spreadsheets. Interested readers can manipulate the spreadsheets to specific configurations of parameter estimates. Summaries appear in this section.

Table 3 reports probability values for testing the null hypothesis that enforcement has no effect on market behavior as revealed by the four market measures. As noted, the *probability value* is the probability that the test statistic could have had the observed Chi-square score by chance under the null hypothesis. The Chi-square score results from applying a Wald test to the null hypothesis that all eight δ parameters are zero. The table has three panels.

[Table 3 HERE]

The top panel provides probability values assuming that Γ=0.5 years. The middle panel gives probability estimates assuming that Γ=1.0 years. The bottom panel provides probability estimates for Γ=1.5 years. Within each panel, the table reports the probability values by county and by drug.

The middle panel pertains to Γ=1.0 years. This panel reports 40 probability values from a maximum of 50 possible tests. Missing tests resulted because the specified drug was not prevalent in the specified county, or there were no enforcement events for that type of drug, or both. If the null hypothesis were true in every county for every drug, then by chance we would expect to observe 40x0.10=4.0 probability values smaller than 0.10. In fact, we observe 17 probability values smaller than 0.10, suggesting that we should reject the null hypothesis (P<0.001).

The upper panel pertains to Γ=0.5 years. This panel reports 39 probability values from a maximum of 50 possible tests. There are fewer tests than in the second panel, because estimation required that at least one event must have occurred within 0.5 years (rather than within 1.0 years) for at least one reported purchase. If the null hypothesis were true in every county for every drug, then by chance we would expect to observe 39x0.10=3.9 probability values smaller than 0.10. In fact, we observe 18 probability values smaller than 0.10, suggesting that we should reject the null hypothesis (P<0.001).

The final panel pertains to Γ=1.5 years. This panel reports 40 probability values from a maximum of 50 possible tests. If the null hypothesis were true in every county for every drug, then by chance we would expect to observe 4.0 probability values smaller than 0.10. In fact, we observe 18 probability values smaller than 0.10, suggesting that we should reject the null hypothesis (P<0.001).

Based on the results appearing in Table 3, we conclude that targeted enforcement events have an effect on market behaviors. We reserve a discussion of the direction and magnitude of the effect until later. Here we note that the patterns of the probability values vary with the assumptions about maximum time

Γ. There are four explanations. One is that different sets of events get included in the estimation depending on the assumption about the maximum time during which an enforcement event is effective. When the assumption is 0.5 years, an enforcement event must have occurred within 0.5 years of a purchase; when the assumption is 1.5 years, an enforcement event must have occurred within 1.5 years of a purchase. Thus, results are sensitive to assumption about the effective period of enforcement, and other things equal, a larger value for Γ is inclusive of more enforcement events. A second explanation is parallel to the first. Even if the assumption about the length of effective enforcement made no difference for which enforcement events get included, the assumption can make a difference for which interviewees enter into the analysis, because in one case all purchases within 1.5 years of an event enter into the analysis, and in the other case all purchases within 0.5 years of an event enter into the analysis. Third, when the assumed period is 1.5 years, we were obliged to eliminate the first six months of ADAM data from the study because we lacked knowledge of enforcement events predating 1999. Finally, our estimation procedure assumes that the effect of an event ends at Γ. At best, Γ is 0.5, 1.0 or 1.5 so that at least two of the three specifications are wrong.

Results from New York, for example, appear to be fairly robust to assumptions about the maximum length of the effectiveness of enforcement, so we use those results to graph the effect of enforcement as a function of when the event happened relative to the purchase date and assumptions about the maximum length of enforcement effectiveness. Figures 2 through 4 show how the probability of a purchase being from a new source appears to have been affected by an enforcement event for crack, powder cocaine and heroin.

Recall from earlier that we used 0.5 as a convenient baseline for the probability that the last purchase was with a new source – that is, we assumed that 50% of transactions were with a new source before the occurrence of the enforcement event. The curves show that the probability of purchasing from a new source increased following the enforcement event, and then ultimately decreased back to 50% as the effectiveness of enforcement eroded. Our model dictates the decline to 50%.

Assumptions about the length of the maximum period of enforcement effectiven *matter*. For both crack and powder cocaine, an assumption that enforcement is effectiveness for a maximum of 0.5 years or for a maximum of 1.0 years provides conclusions that enforcement increases the probability that the seller will be a new source. However, assuming a maximum 1.5-year period of effectiveness leads to a contrary qualitative conclusion. Moreover, enforcement appears to have the opposite effect on heroin markets.

Drawing comparable figures for all the counties, drugs and assumptions about the deterioration of law enforcement effectiveness would be unproductive – there are too many graphs. As a summary device, we have estimated the average effect over a one-year period assuming a one-year maximum period of effectiveness. This estimate used the integration discussed earlier. As before, we scaled the effect by assuming that half of all transactions were from a new source prior to any enforcement event.

[Table 4 Here]

Caution is required. The Wald test, whose results were summarized in Table 4, is a joint test of all δ parameters across the four market indicators. There is no assurance that any pair of δs is significant for a specific market indicator; given the quadratic specification, we anticipate considerable sampling variation in the estimates reported in Table 4.

The table is organized by county, by drug, and by market indicator (Source, Contact, Location and Neighborhood). A positive number in a cell indicates that the average effect was toward (1) causing buyers to use new sources; (2) causing buyers to approach the seller at work, in a social setting or in a public setting; (3) causing the buyer to make the purchase in a public area; and (4) causing the buyer to make the purchase outside his neighborhood.

There is no easily discernable pattern in these tables. While Table 2 presented evidence that enforcement affects market behaviors, Table 3 says that we cannot predict the direction of this effect. The effects do not appear to be large, but recall that these are averages over a one-year period, and the model specification forces the effect to be zero at the end of one year. There is so much diversity across markets and across market participants that just how targeted enforcement affects markets is unpredictable, or at least, not obvious from the current analysis of these data.

Buyer Characteristics Affect Market Behaviors

The regressions included control variables in addition to indications of enforcement activities. Table 5 shows the parameter estimates (and the probability value for a t-statistic) for the EXPERIENCE variable when SOURCE was the dependent variable. A negative parameter implies that experienced users tend to purchase from known sources. The findings imply that experienced buyers have a larger probability of purchasing from a known source than do inexperienced buyers.

[Table 5 Here]

To quantify how much EXPERIENCE matters, let P be the baseline probability of using a regular source, and let λ represent the parameter from Table 5. Then the marginal effect that a unit change in EXPERIENCE has on the probability P of purchasing from a regular is approximately:

$$-P(1-P)\lambda$$

For convenience, set P=0.5, which is to say that on average about half the purchases are with regular sources. Let $\bar{\lambda}$ equal the cross-site average parameter value conditional on the drug. Let S equal two times the standard deviation for the EXPERIENCE variables. Then the effect that a two standard deviation change has on the probability of purchasing from a regular source is approximately:

$$-P(1-P)\lambda S$$

Table 2 reports the standard deviation for the EXPERIENCE variable, which varies over the drugs and over the counties. By this measure, experienced crack users are about 0.14 more likely to purchase from a known source than are inexperienced buyers, and the comparable estimates for the other drugs are about 0.11 for powdered cocaine, about 0.22 for heroin, about 0.14 for methamphetamine, and about 0.10 for marijuana. The evidence is both intuitive and compelling that experienced users are more likely to purchase from regular sources.

Some additional variables may be of interest. Table 6 reports the parameter estimates for age when the dependent variable is the SOURCE. The conclusions seem clear. Age is not a predictor of purchasing from a regular source once other factors are taken into account.

[Table 6 here]

Table 7 reports parameter estimates for education, defined here as lacking a high school degree. Education appears to have little effect on market participation once other variables are taken into account.

[Table 7 here]

Table 8 reports the parameter for race (Black). The findings are not as clear, but nevertheless there is no strong evidence that purchasing from a regular source varies with race/ethnicity after controlling for experience. Thirteen of the probability values are 0.10 or less. Still, there are 47 tests, and by chance we would expect 4.7 significant tests under the null that race/ethnicity do not matter. When significant, the parameter estimate is typically positive, implying that Blacks tend to be less likely to purchase from a regular source than is true of other buyers.

[Table 8 here]

Table 9 reports parameter estimates for the condition: Not Working. Thirteen of 47 tests have probability values of 0.10 or lower, while we would only expect 4.7 by chance. However, there is no consistency to the signs of these parameter estimates, so it is difficult to believe that unemployment provides a universal explanation for market participation.

[Table 9 here]

Does Law Enforcement Affect Prices?

If drug trafficking and supply is sufficiently concentrated within one or a few large organizations, then targeted enforcement can lead to drug shortages by eliminating one of the organizations or by at least disrupting its operations by seizing assets and stock. If law enforcement causes shortages in local drug markets, then we would expect prices to increase as supply adjusts to demand. Can we observe such price increases following enforcement events?

Unfortunately, our ability to answer this question is severely constrained by an absence of information about illegal drug prices. That is, ADAM reveals nominal prices, but it cannot tell the real price of units of pure drugs purchased per dollar expenditure. STRIDE reveals prices paid by law enforcement agents during undercover street buys (defined as an expenditure of between $10 and $1000), but only a few ADAM counties had over 50 buys for drugs of interest. Other sites typically had fewer than 50.

We measure the price of an illicit drug as the number of pure grams purchased per dollar paid. This is a useful measure, because the nominal price of a drug rarely changes, so that a price increase manifests as a fall in purity, and a decrease in price manifests as an increase in purity. As explained earlier, we first estimated a regression where pure grams per dollar paid was the dependent variable and the independent variables were (1) fixed effects for an MSA where the purchase happened and (2) a fixed effect for the quarter. We expected this regression to identify the average price for an MSA and variation in that average attributable to source country eradication, transit zone interdiction, and domestic enforcement with national implications. Using the predictions from this first regression, we

computed residuals defined as the price observed in the ADAM county minus the predictions for that same site. We then regressed those residuals on the enforcement events.

We adopted this two step-estimation procedure because we could use data from both ADAM and non-ADAM counties to identify and estimate the effect from source-area interventions and interdiction. The second regression took those effects as given and sought to estimate how local enforcement events affected local prices.

The number of street purchases of cocaine, by county, was 1081 for New York; 172 for San Diego; and 68 for Salt Lake City. There was no evidence that the purity of cocaine in New York varied with targeted enforcement. Purity declined in both Salt Lake City and in San Diego. It also declined in Denver, but that latter effect was based on only 15 observations.[6]

The number of street purchases of heroin, by county, was 1027 for New York, 300 for San Diego, and 143 for Phoenix. Targeted enforcement caused purity to decline initially in New York, although the purity eventually increased later in the one-year period. The purity declined in San Diego and it declined in Phoenix. Purity seemed to increase in Portland, but that finding was based on only 25 observations.[7]

San Diego provided 343 methamphetamine purchases. Purity fell, but this effect was not statistically significant. Purity fell in San Jose, but there were only 11 observations.[8]

Thus, there is some evidence that targeted enforcement increase the real price of illegal drugs by decreasing the purity of street-level sales. However, the evidence is not strong, principally because data are sparse in most places.

Other Changes in Market Behaviors

To this point, we have concluded that targeted enforcement appears to reduce availability, thereby increasing shortages and increasing real prices, and apparently causing local markets to adjust to the temporary scarcity. We now ask: Has consumption changed as a result?

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[6] The two parameters associated with the EVENTS variable were both significant at 0.10 in New York. These parameters were defined in formula [2]. The first parameter was negative and significant at 0.001 in Salt Lake City. The first parameter was negative and had a p-value of 0.177 in San Diego. Although there were only 15 observations from Denver, the first parameter was negative with a t-score of -1.77.

[7] In New York, the first parameter was negative with a t-score of -1.42; the second was positive with a t-score of 3.43. Both parameters were negative in San Diego. The first had a t-score of -1.15; the second had a t-score of -1.85. In Phoenix, the first parameter was positive, but not significantly different from 0 (t = 0.97). The second parameter was negative with a t-score of -2.14. In San Jose, the first parameter was negative with a t-score of -1.45; the second was positive with a t-score of 1.73. Although there were only 25 observations in Portland, the first parameter was positive with a t-score of 3.13, and the second was negative with a t-score of -1.96.

[8] In San Diego, both parameters were negative, but neither approached statistical significance. Although there were only 11 observations in San Jose, the first parameter was negative with a t-score of -1.45, and the second was positive with a t-score of 1.73.

By changing the dependent variable in the regression specification and by changing the subpopulation used in the analysis, we can potentially answer questions about consumption.

1. Does the probability of testing positive for a specific drug decrease following a major enforcement event? To answer this question, we use a logistic regression with the drug test result (1 denotes positive and 0 denotes negative) as the dependent variable. The population of arrestees is the study population.

We found no strong evidence that enforcement events affected the probability that an arrestee would test positive for the drug in question. We were able to estimate 27 regressions. Using $P<0.10$ as a level of significance, we would expect that the enforcement event would be significant in 2.7 regressions. In fact, enforcement was significant in slightly more – 4 regressions – but even in these four, the effect was positive in two and negative in two. There is no evidence that enforcement affected the recent use of the drug among arrestees.

2. Does the probability of making a purchase for a specified drug decrease following a major enforcement event? To answer this question, we again used a logistic regression with the report of a purchase (1 denotes a purchase and 0 denotes no purchase) as the dependent variable. The population of arrestees who used the drug during the previous year is the study population.

We could estimate 29 regressions. Using $P<0.10$ as the criterion for statistical significance, we would expect the parameter to be significant in about 3 regressions. It was only significant in 4. When we restricted the study group to just those users who said they had purchased in the last month, the effect was significant in just one case. We conclude that enforcement did not have any effect on the probability that an established drug user would purchase drugs during the month prior to his arrest.

There is an apparent difficulty when attempting to answer these questions using ADAM data. The analysis implicitly assumes that the population of arrestees remains constant so we can assess whether drug use has declined in this population. The problem is that the population may have changed as a result of shortages of a drug. Possibly some offenders entered treatment, and were less likely to be arrested. Possibly occasional users stopped using and thus had less exposure to local law enforcement.

3. Do inexperienced users depart from the market, leaving experienced users as market participants? To answer this question, we used the EXPERIENCE variable as a dependent variable. The analysis was based on least squares regression. The study population was those arrestees who had made a purchase during the last month.

We estimated 29 regressions. By chance we would expect about 3 to be significant, but in fact only 1 was significant. We conclude that enforcement has not driven inexperienced users from the market. Thus it does not appear that targeted enforcement is radically altering the mix of drug users who appear in an arrestee population.

4. Does the amount spent on illegal drugs change after an enforcement event? To answer this question we used expenditures as the dependent variable. We used OLS regression for the estimation. The study population comprised arrestees who purchased drugs during the last month.

We estimated 29 regressions. Only 4 were statistically significant. There was no evidence that enforcement had changed how much drug users spent on their purchases.

How can we explain these latter findings? Apparently law enforcement can affect the way that illegal drug markets operate. Apparently enforcement can affect illegal drug prices. Why, then, does enforcement have no apparent effect on purchasing behaviors?

One explanation is that law enforcement does reduce the availability of illegal drugs but that suppliers adjust by diluting their product and hence increasing the real price of their product. However, nominal prices do not change. Thus, if buyers spend a fixed percentage of their income on illegal drugs, they will continue to buy the same amount of illegal drugs but at a lower purity. They will be just as likely to test positive in a booking facility; they will report buying and using the same amount of drugs. This is consistent with an expenditure elasticity of –1 – an estimate that is consistent with the literature reported earlier.

Even with this explanation, we continue to find it curious that inexperienced users appear in the ADAM data with the same frequency following a major enforcement event. We would have expected them to appear less frequently because their inexperience with illegal drug markets would hinder their finding new sources. That does not appear to have happened and the explanation is speculative, but it seems possible that there are few really inexperienced buyers among arrestees. Granted, there are *relatively* experienced and inexperienced buyers, but in fact almost all buyers who appear in an arrestee pool are experienced in the sense that they frequently purchase drugs.

One could also argue that examining a pool of arrested drug users confuses two possible explanations. One is that the pool of arrestees stays constant, and within that pool, everyone continues to use drugs at the same rate. The other is that users change their consumption decisions, this decision in turn affects the likelihood of an arrest, and hence, the probability of appearing in a sample of arrestees. We cannot totally discount that possibility, but if it had occurred, we would have expected to see some changes in the EXPERIENCE of the pool of arrestees. That did not happen.

5.0 Conclusions

We Americans spend billions of dollars every year on education. We collect performance statistics providing a means to support cross-sectional and time-series analysis of educational innovations. The Federal Department of Education alone has a research budget of roughly half a billion dollars per year. For sure, there is active debate and disagreement about educational policies and practices, but that debate takes places within an environment that is informed by rigorous scientific study.

Americans spend billions of dollars every year on pharmaceuticals. Debate ranges about whether drugs are over prescribed or under prescribed, about who should access life-improving drugs and who should pay, and about profitability and social responsibility. But imagine a world where there was no Food and Drug Administration requiring studies of drug efficacy, no Department of Health and Human Services sponsoring studies or health care delivery, and no third-party payers routinely collecting data about delivery and usage. The prescription of pharmaceuticals and the delivery of health care are based on scientific study.

The federal government alone spent an estimated $13 billion on anti-drug programs during 2006, and this hardly accounts for the billions spent by local anti-drug programs including law enforcement. The quality of our knowledge about the effectiveness of prevention and treatment programs is arguable, but there is little argument about the state of knowledge about enforcement: Twenty years after the beginning of the war on drugs, little is known about what works and what does not work (National Research Council, 2001). This really is a world with an equivalent to the absence of an FDA, HHS, or even an industry with an active research agenda to identify effective practices.

We believe that an ADAM-type survey would be a useful means of evaluating the effectiveness of enforcement programs designed to decrease the availability of illegal drugs and hence the abuse of those drugs. The current ADAM program was not designed as an evaluation tool, but it does include survey questions about drug market behaviors. Consequently we sought to learn if what ADAM could tell us about how targeted enforcement – enforcement intended to disrupt the ability of major drug distributors to move drugs to market – affected drug markets.

Results from ADAM show that major enforcement events impact retail markets. The impact has two important dimensions. First, major enforcement events cause buyers to alter the way that they purchase drugs. The effect dissipates over time, although the analysis was unable to be precise about how long at least some of the effects remain. Second, enforcement appears to reduce the availability of illegal drugs, to increase their prices, and decrease their consumption in real terms of pure drugs. At least, these conclusions seem to be a reasonable way of telling the story about what we observed, but the evidence is weaker than we would like.

We did our best to identify enforcement events, and when we were able to check with police, it appeared that news accounts correctly identified major enforcement activities. We cannot be sure, however, because we were unable to check with all police agencies. Moreover, we were able to count enforcement events, but we were unable to classify the events as highly disruptive or less disruptive. This meant that the destruction of a major distribution operation by arresting a kingpin and his team counted the same as a seizure of a large amount of drugs and its transporters but not the principal dealers. This undoubtedly introduced noise into the statistical analysis. Furthermore, knowledge of major enforcement activity often added very little real data – either there were no major enforcement events or else there were few purchases within six, twelve or eighteen months of an enforcement event. Regrettably, the data were not as informative as we would have liked.

Nevertheless, the ADAM survey has demonstrated an ability to assemble data about market behaviors that advance knowledge of illegal drug market activities. While the analysis reported in this paper was forced to use crude measures of major enforcement events, it was able to link market activity with enforcement events. This demonstration of concept suggests that relatively low cost research could provide useful information for problem oriented policing.

There is no reason that jail-based interviewing could not become a standard practice in urban jails. The cost of collecting four quarters of ADAM data are less than $120,000 per year in all but a few urban settings, and the cost is much less in most settings. This is not a trivial cost, but if law enforcement were to be informed, then an ADAM-type survey would seem to provide a vehicle for learning about drug market behaviors. Moreover, an ADAM-type survey need not be limited to drug use and drug markets. It can be extended to monitor other issues such as mental health, use of weapons, and so on,

by simply adding addenda to the ADAM instrument. The cost of learning about drug markets could be spread across the study of multiple public policy topics.

Our findings point toward a research agenda that would use an ADAM-type survey to study the effectiveness of targeted enforcement practices. That agenda might include the following components:

1. The ADAM survey instrument is valuable for understanding drug use among a population of chronic users who are difficult or impossible to reach with traditional surveys, but ADAM was not designed as an evaluation tool. A research agenda would draft and test ADAM questions that would focus on aspects of local drug markets that should be sensitive to enforcement practices and that would be valuable as criteria for the effectiveness of enforcement practices.
    a. Given that there is no strong theory about how drug users respond to temporary drug scarcity, the survey instrument might benefit from open-ended questions intended to allow respondents to describe changes they have observed in drug availability and to explain how they adjusted to those changes. Over time, these descriptions should lead to closed-end questions.
    b. The survey might be specific to an area. It might for example reference a local street brand name for a drug to see if that had become more or less available. It might reference specific drug dealing areas if those were the target of local enforcement efforts. This type of question is not an interest of the current ADAM program, but there is no reason (beyond the need to avoid incriminating or otherwise sensitive questioning) that a local ADAM-type program could not ask questions of more narrow interest to local enforcement.
    c. The ADAM sampling design and estimation procedures, on the other hand, would transfer to ADAM-type programs. Given that the sampling and estimation procedures as well as the general survey protocol have evolved over several years, there is considerable utility to employ those procedures using a revised instrument.
2. Many enforcement practices are less intended to reduce the supply of illegal drugs than to manage the sequela of drug users in a community. For example, police might be interested in reducing crime in an area where drugs are bought and sold. However, reducing the availability of illegal drugs is surely a goal of enforcement practices, and a good measure of success is the purity of drugs transacted in everyday drug dealing commerce.
    a. We were obliged to use the System to Retrieve Information from Drug Evidence (STRIDE) as an indicator of drug prices and purity. STRIDE was not designed for this purpose, and one can question whether or not STRIDE should be used to monitor drug prices and purity (National Research Council, 2001), but the point here is that there are alternatives.
    b. Acting as undercover agents, police purchase drugs or otherwise seize them as a by-product of making an arrest. Unlike purchases/seizures by federal agents, most local purchases/seizures are not chemically analyzed for purity. Provided one could adequately deal with chain-of-custody concerns, there seems to be little reason why local purchases/seizures could not be analyzed for research purposes. Given that the test results would not be used for evidence, the testing could be inexpensive and subject to documentation suitable for a research project rather than documentation necessary for introducing evidence at court. The DEA already makes controlled retail-level purchases of heroin (Domestic Monitor Program) and has begun a similar program for

cocaine. Although there are questions about the sampling procedure for the DMP program, these could be overcome (Rhodes et al., 1998), and a joint effort by federal and local authorities could provide a data set useful to both with a diminished collection cost for both parties.

c. There are additional sources of data. With knowledge of enforcement activity, a researcher could investigate other issues of interest to the police. For example, changes in the rate of burglary and robbery around a targeted area are surely of interest and are complementary measures to arrestee reports.

3. Clearly such an evaluation could not be done without the active participation of a police agency. Researchers cannot buy illegal drugs with impunity even for research purposes; also, police control access to arrestees. Another reason for police participation is to identify enforcement events with sufficient detail that data can be used in a study such as that reported here.
   a. The level of detail is a design issue. For what we have identified as targeted law enforcement, detail would certainly include intelligence about the importance of an organization to local drug dealing. It would include information about the success of the operations. Did they remove the leader and sufficient infrastructure that the group is unlikely to reemerge as a market force? Or did the operation simply seize drugs and other assets – important but unlikely to have a major sustained effect on markets? Intelligence reports typically report the volume of trade attributed to organizations; ADAM can provide estimates of the amount of drugs consumed in a county. Together these sources provide a measure of importance of an organization that, regrettably, we could not include in our own analysis.
   b. While we were interested in the effect of targeted law enforcement events, there is no reason that local evaluations should be similarly constrained. A focused attack on a specific dealing area will have repercussions that may be difficult to observe, but an ADAM-type instrument could ask pointed questions intended to learn how such focused activities affected buying and selling. This would require some coordination to assure that the ADAM-type instrument anticipates the activity and provides pretest data.
   c. One reviewer of this report opined that intelligence reports are confidential because they identified sources of information that would be threatened by exposure and active traffickers who might be warned by knowledge of ongoing investigations. Clearly there is merit to this argument, but it confused academic research (of minimal value to enforcement agents) with policy analysis. For the latter purpose, there is no reason that intelligence could not be redacted to remove sensitive information. After all, the analysis likely to be of interest does not require the detail found in intelligence files. Even if redaction were impossible, researchers acting as policy analysis frequently can work with security clearances and restricted or even complete ability to disclose. Our own recent work with the DEA (on a separate project) resulted in a DEA review that requested rewriting text deemed potential harmful to DEA foreign collaborators if it were to appear in an open source.

4. The analysis used in this report was complicated, but a simpler analysis would be effective for a different problem.
   a. For our analysis, the problem was that we were uncertain how to assemble market questions to reflect aspects of local drug markets that were amenable to change by

targeted law enforcement. Solving this problem should be part of the research agenda, and once the problem is solved, the work reported in appendix 1 would be moot.

b. Surely the complexity of our analysis was dictated by a need to identify the lag-structure of enforcement events. However, if an investigator started with an enforcement event, he or she could simply see how that enforcement event affected market behavior post-intervention. Simple tabulations could do the job provided there were no confounding events, such as multiple enforcement events within close proximity. The latter would introduce additional complexity, but still might not necessitate the development of a complex lag-structure.
c. Indeed, we sought to develop a universal statistical model that had sufficient flexibility that it could be applied in each of the ten study sites. The need for flexibility led to the adoption of a complicated model. A study of a single place would not require that flexibility and hence, statistical modeling would be simpler and more transparent.

Our research was motivated by observations made by the National Research Council that spending billions of dollars on enforcement with little knowledge of what it accomplishes is socially wasteful. We sought to provide a partial demonstration of how social science research could inform law enforcement practices. Our approach was motivated by extensive experience with ADAM, which we see as a platform for answering policy questions beyond the current narrow range of questions for which ADAM was designed. Our objective has been satisfied in this current study – despite its obvious limitations – and points toward a research agenda that could enhance the future of problem oriented policing.

Appendix 1: Statistical Methodology for Recoding Market Indicator Variables

We used multinomial logistic regression to deduce the ordering for the three market indicator variables exclusive of source. There were three regressions. We created three dummy variables from the source variable, and we used those dummy variables as dependent variables in each of the three regressions. The first regression used the method of contact (four categories) as the independent variable. The second used the location of the purchase (three categories) as the independent variable. And the third used the binary variable denoting a purchase outside the neighborhood as the independent variable. Essentially we wanted to order responses to the non-source variables so that the reordered non-source variables were highly correlated with the source variable.

Let P_{ij} represent the probability of using the ith source (i=1..3) conditional on using the jth method of contact (j=1…4). There are twelve parameters but three are constrained because probabilities across an exhaustive set of outcomes must sum to 1. We label these twelve parameters β_{ij}.

Then the probability of using the ith source conditional on using the jth method of contact is:

[1] $$P_{ij} = \frac{e^{\beta_{i1}(j=1)+\beta_{i2}(j=2)+\beta_{i3}(j=3)+\beta_{i4}(j=4)}}{\sum_{i=1}^{3} e^{\beta_{i1}(j=1)+\beta_{i2}(j=2)+\beta_{i3}(j=3)+\beta_{ir}(j=4)}}$$

We use terms like (j=1) to denote a dummy variable, in this case, that the buyer used a telephone (j=1). Once we have estimated the parameters in [1], we compute expressions like:

[2] $$\frac{P_{11}}{P_{31}}$$

This is the ratio of (1) the probability of using a regular source when the method of contact is by phone and (2) the probability of using a new source when the method of contact is by phone. We are interested in this ratio because if:

$$\frac{P_{1j}}{P_{3j}} > \frac{P_{1k}}{P_{3k}}$$

then we would infer that method of contact j tends to be associated with dealing with a regular source, thereby implying an ordering for the contact variable.

Equation [2] can be rewritten as:

$$[3] \qquad \frac{P_{11}}{P_{31}} = \frac{e^{\beta_{11}} \Big/ \sum_{i=1}^{3} e^{\beta_{i1}}}{e^{\beta_{31}} \Big/ \sum_{i=1}^{3} e^{\beta_{i1}}} = \frac{e^{\beta_{11}}}{e^{\beta_{31}}}$$

Taking the logarithm, this gives the log-odds ratio:

$$[4] \qquad \ln\left(\frac{P_{11}}{P_{31}}\right) = \beta_{11} - \beta_{31}$$

This expression can be manipulated for other methods of contact,

This illustration assumes that method of contact is the dependent variable. The illustration would not change much if the other market variables (location and neighborhood) had been selected for the illustration, although each regression would have a different set of parameters.

Table A1 reports the log-odds ratio [4] for the three different independent variables: method of contact, location of purchase, and neighborhood. The table has separate partitions for the method of contact, the location of purchase, and the neighborhood. It has separate rows for each of the ten study sites. We have arranged the columns so that the log-odds ratios [4] generally but not always decrease from left to right.

[Table A1 Here]

The difference between the log-odds is the best metric of how much movement across a column matters. On average, the difference between the log-odds ratio for contact by telephone and contact by going to a house/apartment is only 0.90. The difference between the log-odds for going to a house/apartment and making contact in a social setting is 2.02. The difference between the log-odds for making contact in a social setting and making contact in a public setting is just 0.30. Thus, it seems reasonable to distinguish between contacts that are made by telephone or going to a house/apartment and contacts made in a social or public setting.

The differences between the log-odds for the location of the purchase are not very large. The average difference is 0.61 for location in a house/apartment and location in a public/abandoned building, and the average difference is 0.80 for location in a public/abandoned building and location on the streets/outdoors. Our coding of the LOCATION variable maintained this order, but we note that the differences are not very large.

The differences in the log-odds for the neighborhood variable are apparent. Purchases within the buyer's neighborhood imply purchases from a regular source; purchases outside the buyer's neighborhood imply purchases from a new source.

Log-odds ratios are difficult to interpret. A more intuitive way to examine these data is to build a table that reports the probability of purchasing from the buyer's regular source instead of the odds-ratio.

We find Table A2 to be a convenient way to view the data, but the statistics reported in Table A2 are not simply a different way of presenting the evidence appearing in Table A1. When compared across columns, the log-odds ratios can be statistically different when the probabilities of purchasing in a closed market are not statistically different. (Shadings show differences across columns that are statistically significant.) Nevertheless, the two are in close correspondence, and the latter is easier to interpret.

[Table A2 Here]

Table A2 shows that the probability of purchasing from a regular source varies materially with method of contact, location of purchase and neighborhood. Purchasing from a regular source in a public setting is not rare, but nevertheless, purchasing from a regular source is more likely when the contact is by telephone/house than when it is in a public setting. With one exception, the rankings for method of contact run from telephone (most closed), house/apartment, social setting, and public setting (most open). The exception is heroin, where making contact at a social setting may be more open than making contact at a public setting.

Also consistent with earlier findings, purchasing from a regular source is more likely when the the buy occurs in a house/apartment and less likely when the purchase occurs on the street or other outdoor location. However, purchases on the street or other outdoor settings are not dramatically different from purchases made in public/abandoned building with respect to whether or not the purchase is made from a regular source.

The pattern seems clear that purchases within a neighborhood tend to be more closed than purchases made outside the neighborhood. Nevertheless, many purchases from regular sources occur outside the buyer's neighborhood.

Appendix 2: Identifying Law Enforcement Events

Search of Newspaper Archives

To develop a history of police activities and events, we conducted a search of selected major newspapers in a sample of cities across the United States. To conduct the search, we developed a process that provided: (1) the means for identifying articles for examination; (2) guidelines for examining and categorizing articles for content relevant to key law enforcement activities (e.g., practices, policies, initiatives) and the resultant "major events" (e.g., key arrests, major drug seizures); and, (3) information that enhanced the capacity of the interview component to extract additional information on these policing activities/events and their relationship to local drug markets and drug-related activities.

The major strength of our approach is that it allowed us to obtain relevant information on local law enforcement activities that are not readily available and would be prohibitively costly and time consuming to obtain through other means (i.e., directly from law enforcement agencies). It also provided focus to follow-up interviews with law enforcement officials on strategies their departments have implemented to reduce drug market and related activities in their areas. We do realize that there are limitations to our approach, such as the collected data being limited to what is reported in the newspaper media. That is, while our investigation may be structured and rigorous, what the newspapers chose to report is not. We believe, however, that even in the face of this limitation the information we obtained from the newspaper reports included more specific detail than would be available through law enforcement websites, police department annual reports, and similar forms of documentation. We also believe that among activities local law enforcement engage in, the newspapers are more likely to report high-profile operations and successful outcomes of those operations (e.g., arrests, seizures), which are the types of events of interest for this study.

Archival Databases

The first step in designing our approach was determining the universe for analysis. Since the goal of the data collection activity was to gather information to learn about law enforcement activities and their impact on drug markets in multiple cities, we defined the universe as all newspaper reporting relating to law enforcement anti-drug activities during the period of interest.[9] This universe was restricted to the reporting found in the major newspapers that serve the cities targeted for examination in this study.

The next step was determining the best means for extracting appropriate content from the targeted newspapers. Two sources were selected for consideration: (1) microfilm; and (2) internet-based newspaper archives. Although microfilm is readily available at local libraries, the time required to review and identify appropriate content is unacceptably high for this study. Since the point of this exercise is investigative, microfilm was not selected for this study. Internet-based newspapers archives provide a flexible, user-friendly approach that simplifies the search process. Multiple newspapers can be searched simultaneously for content utilizing fixed search parameters. This simplifies the search process, standardizes results across many newspapers, and significantly reduces the amount of time

[9] We included articles from 1999 in our study, as events that took place in 1999 could cause a disruption in the local drug market in 2000.

needed to conduct searches. For these reasons internet-based newspaper archives were used in this study.

Two internet-based newspaper archive services were examined for use: NewsLibrary and LexisNexis. Our review of both services included:

- Testing each database for ease of use;
- Identifying the number of newspapers included in each database;
- Testing the power and flexibility of each database's search engine;
- Assessing the level of information provided by search results;
- Determining the ease of accessing full newspaper articles; and,
- Establishing the cost associated with downloading articles.

Each database was reviewed with these criteria in mind and the advantages and disadvantages of both were weighed. Both provide access to over 800 major U.S. newspapers for the time period of interest and have similar search capabilities. However, the two varied on the presentation of the results and access to the full article for review. While NewsLibrary allows one to search multiple newspapers simultaneously using the same search terms and provides the first six lines from each article, articles could only be retrieved on a pay as you go basis. LexisNexis, on the other hand, has similar flexibility in its search capabilities, allows the researcher to specify the number of words around search terms included in the output, and provides full access to newspaper content for an annual fee.

Although LexisNexis appeared to be more appropriate for our study, we decided to test both systems to ensure that search capabilities worked as anticipated and the search output would be useful to the study. Potential search parameters also needed to be identified and tested for efficiency and contribution when combined with other search terms.

Search Terms

One of the first steps in developing data collection protocols involved ensuring that search parameters produced results that were expected and useful to the study. To explore internet-based newspaper content, the following thirteen initial search parameters were created and tested:

- Gangs and Drugs;
- Gangs and Police;
- Police and Drugs;
- Drug Enforcement and Gangs;
- Drug Enforcement and Police;
- Drugs and Police Programs and Denver;
- Drugs and Community and Initiatives;
- Police and drugs and profiling;
- Task Force and Drugs;
- Task Force and Police;
- Task Force and Gangs;
- Sting and Drugs; and
- Drugs and Raid.

These search parameters were created through team discussion of what we anticipated finding in general searches of reporting related to our research. Through the group discussion, search parameters were designed and tested. The objective of this testing was to determine: (1) the scope of available information related to the needs of our research; (2) the amount of overlap between search parameters; and (3) the usefulness of the search terms in capturing appropriate responses.

We realized that certain limitations existed in implementing this aspect of our search. Central to this concern is that some material will not be captured in the search due to variations in the reporting of and language associated with events. In addition, some may question the level of overlap among search parameters, pointing toward the absence of mutual exclusiveness among search parameters. By design, we wanted a moderate level of "overlap" between search categories. This supports the assumption that the search parameters are capturing the majority of relevant content while revealing vital areas where information may be missing.

Testing Search Terms

We decided to select one site to test both the search engines and search terms. The city of Denver was selected and the Denver Post and Rocky Mountain News were identified as having the highest circulation rates in the county of Denver. These newspapers cover the same reporting area and provided the opportunity to gauge the coverage of police and drug market activities from two reporting perspectives.

First we ran the same search terms using both LexisNexis and NewsLibrary to ensure that the output generated was similar. After determining both engines produced similar results, we split the search terms in half, running half using LexisNexis and the other half using NewsLibrary. After comparing the user capabilities of the two and the presentation of the output, it was decided that LexisNexis was the preferred search vehicle. NewsLibrary's access to full article content is on the pay-per-article basis and its search capabilities are not as powerful. These two limitations made producing complete output in NewsLibrary more difficult, time consuming, and potentially more costly.

LexisNexis provides full access to newspaper content for one fee, has powerful search capabilities (e.g., multiple year, article marking/saving, search-within-a-search capability), and with the exception of four cities (Omaha, Honolulu, Phoenix and Indianapolis) provides access to every newspaper we were potentially interested in reviewing.[10] It was also determined that there was limited value in searching content for two competing major newspapers serving the same area. The significant amount of overlap in the reporting was inefficient.

The second goal of our test was to explore the value of the search parameters to: (1) determine their effectiveness in yielding useful material; and, (2) judge the amount of overlap between search categories. Two reviewers conducted the test, reviewing the results of each search and discussing what was learned from the output. The following table provides an overview of the findings of this test.

[Table A3 Here]
As is revealed in Table A3, the following six terms generated desirable results:

[10] NewsLibrary was used for the newspapers not covered in LexisNexis.

- Gangs & Drugs;
- Task Force & Drugs;
- Sting & Drugs;
- Drug Enforcement & Police;
- Task Force & Gangs; and
- Drugs & Raid.

With respect to the search terms, a high level of agreement was noticed among reviewers in terms of article selection and satisfaction with the search terms. The other seven were found to generate such a low level of desirable articles that they were deemed not useful. The research team concluded that the final six terms were: (1) generally exhaustive; (2) capture what they are intended to capture; and (3) support the goals of this study.

Protocol Development

Before conducting our analysis in the other selected sites, protocols were developed to conduct the search and document findings. The search for each site consisted of the following steps:

(1) Identification of the newspaper with the highest circulation rates in the targeted city.
(2) Conduct a search using LexisNexis and the six search terms for the time period covering January 1, 1999 and December 31, 2004.
(3) Review the abstract for each article, identifying articles likely to be relevant to the study.
(4) Read the full articles for all those identified in the above review and write a brief summary for all events relevant to the study.
(5) Review the identified events to split the events into those likely to have a direct versus indirect impact on local markets.
(5) Use the summaries to enter pertinent data into a database to be used to conduct the analysis.

The process for selecting which newspapers to include in the analysis of local drug market and law enforcement activities considered four things: (1) overall reporting markets for newspapers in the cities of interest; (2) the local coverage area for each newspaper; (3) whether the newspaper is published daily or weekly; and (4) whether the newspaper is considered a "major news source" for the selected city (based on circulation/readership rates greater than 250,000). Overall, newspapers were selected for the study if they provided daily reporting, dominated the local newspaper market, and provided reporting on the topics of interest.

The most subjective and, therefore, most difficult, aspect of completing these tasks was identifying the types of events of interest to the study. The logic model was used to guide decision-making, focusing the review on events related to organizational or procedural changes relevant to local drug enforcement, as well as specific local, regional and federal anti-drug enforcement activities. Among enforcement activities, we decided to exclude activities targeting marijuana, because the lack of volatility among marijuana markets made it more difficult to observe and study trends.

Another decision that was made early in the process was the level of interest in enforcement activities that took place outside of the target area, i.e., those that took place in neighboring counties. It was decided that, although the search would not be targeted to these neighboring counties, significant events (i.e., arrest of an active member of the drug dealing community, a seizure of a multiple

kilogram/pounds of drugs, or raid involving multiple law enforcement agencies (including representatives from the target area)) occurring outside the target area should be identified and included in the analysis.

As Table A3 indicates, there was a fair amount of filtering to identify events of interest for the study. Articles that were not relevant, but that consistently came up across the sites, included articles reporting on the sum of arrests, seizures, or busts of methamphetamine labs over a 6-month or annual period, but did not describe specific events. These articles were not included in the analysis because annual statistics could be obtained from alternate sources. Other types of articles excluded included opinion or editorial pieces on the "drug problem" in that particular city, reporting on the seizures of trace amount of drugs, arrests that resulted in low-level charges, and events that took place well outside of the target area (e.g., Mexican border in non-border states, in another state). Although subjective, reviewers were able to identify events likely to cause a disruption to local drug markets, providing useful material for follow-up discussions with local law enforcement.

Table A4 presents the results of the search, in terms of the number of articles identified using the six search terms and the number of events identified for inclusion in the analysis.

[Table A4 Here]

As stated earlier, the research team was aware of the strengths and weaknesses of using newspaper media to identify enforcement activities, but felt it was the best option for minimizing burden on local law enforcement. Specifically, there was concern that local media markets might place varying degrees of attention on drug reporting or law enforcement agencies may be more or less inclined to use the media to publicize enforcement activities. As the above table indicates, we found variation in the reporting across the sites, some of which may be attributed to the concerns expressed above. The table below reports on observations made by members of the research team after reviewing the results of the searches for each site. We explored as many of these observations as possible with local law enforcement during our follow-up calls.

[Table A5 Here]

Interviews with Local Law Enforcement

Before contacting local law enforcement, the executive of the primary law enforcement agency serving the study site was Fed Ex'd a letter of introduction and a copy of the tailored discussion guide and narrative. A sample discussion guide used with Denver law enforcement is attached (minor modifications were made to tailor the guide to other sites). The letter requested that the executive provide an appropriate contact for the information of interest. Follow-up phone calls were made to executives who did not respond within a week. Contacts provided by the department were sent the same introductory letter and a copy of the tailored discussion guide to assist them in preparing for our discussion.

The following table (Table A6) summarizes responses received by each department and whether follow-up interviews were successfully completed with a department representative.

[Table A6 Here]

Attachment 2.1: Discussion Guide for Denver

1. Introduction

Hi, thank you for agreeing to talk with me today. As a reminder, I will limit our discussion to no more than 30 minutes. I would also like to reiterate that your participation in this study is completely voluntary and you may decline to discuss any particular event or stop altogether at any time. Your refusal to participate will not jeopardize your relationship with the Federal government or with your department or agency. To ensure confidentiality, your identity as a participant in this study will not be shared with anyone outside Abt Associates Inc's research team.

The information you provide to us will be used to verify the information we have collected on your department's resources, enforcement activities, and drug markets in Denver. Data will be reported for each jurisdiction in the study (between 10 to 20 jurisdictions) to NIJ/BJA at the completion of the research (regardless of whether you or someone else in your department speaks with us). We will take precautions to protect your identity and data will never be presented identifying you or other police officers we talk to, that is, your name or any other personal information that might link you to the study will not be provided in any reports to NIJ/BJA or to anyone else outside of the research team.

If you have any questions about the study or about your participation in it, you may contact Dr. William Rhodes at (617) 349-2731. Please note this is a toll call.

Before we start do you have any questions?

Let's begin.

I. Department Resources

Before discussing some of the events we identified through newspaper accounts, I would like to discuss the resources your department has been able to devote to drug law enforcement.

1. First, I would like to review Table 1 with you. The table summarizes the department's manpower (including the total number of full-time sworn officers and total number of full-time officers devoted to drug law enforcement) from 1999 through 2003 according to reports from federal sources. The reports are incomplete, and may be erroneous.
    a. Would you please check the staffing numbers for accuracy and make any necessary corrections?
    b. Also, would you please insert numbers where they are missing?

Table 1. Total Number of Sworn Officers and Sworn Officers Devoted to Drug Law Enforcement

Year	# of Sworn Officer FTEs	# of Special Drug Enforcement Unit FTEs	# of Multi-Agency Drug Task Force FTEs
1999	1424	30*	7*
2000	1441	0	2
2001	1495	40*	6*
2002	1504	44*	7*
2003	1460	9	6

*These are estimates.

2. Now I have a question about the actual numbers of law enforcement personnel.
    We note some apparently large changes from year-to-year in staffing levels. Can you provide an explanation for these changes?

3. Manpower numbers may not capture all the resources that are applied to drug law enforcement and changes in other resources may have affected your Department's ability to engage in drug law enforcement activities.
    a. Have there been other changes in Denver that have affected the Department's ability to enforce drug laws?
        i. Have there been any organizational changes (e.g. change in chief)? If yes, what year did these changes take place?
        ii. Have there been any programmatic changes (e.g. merger of vice and narcotic units)? If yes, what year did these changes take place?
        iii. Have there been any policy changes (e.g., change in the level of approval for no-knock raids)? If yes, what year did these changes take place?

II. Special Enforcement Activities

Before discussing specific law enforcement events, I'd like to talk about the drug law enforcement activities in your area.

1. Which law enforcement units have primary responsibility for drug enforcement in these areas?
2. Do these units routinely collaborate with other agencies and departments? How often and with which agencies? Are there special circumstances when this occurs or is it routine?
3. Which of the following activities are routine?
    a. Foot patrol
    b. Intelligence gathering (from other officers, informants, surveillance, hotline, etc)
    c. Investigations
    d. Financial investigations
    e. Developing confidential informants
    f. Undercover buys
    g. Executing search warrants
    h. Sweeps
    i. Raids
    j. Reverse stings
    k. Seizures (drugs, assets)
    l. Civil remedies (e.g., curfews)
    m. Making physical changes to the area (e.g., barricades)

Using various sources, we have identified major law enforcement events that have occurred between 1999 and 2003. We are asking that you help us refine this list.

Figure 1 below, identifies major enforcement events and when they happened. Attachment A provides more detail about these events.

Please note:

- These events are limited to those that are expected to have an appreciable impact on drug markets.
- Some of these events may have occurred outside your jurisdiction but we want to talk about them because we believe they are important and might have had an impact on the local drug market in Denver.
- The figure identifies the date (year, month and day) that an arrest or indictment occurred; sometimes a conviction is substituted for the arrest/indictment.
- The figure identifies the amount of drugs seized by type of drug.

1. Now let's discuss the events. First, have we missed significant events? That is, would you add major law enforcement initiatives to this list?

2. Second, have we erred with this list? Are there events that should be deleted?

3. Third, do we have any of the details wrong?

4. Fourth, would you help us rank these events from high (number 1) to low (number 10) with respect to their importance in disrupting drug markets? Note equal ranks are acceptable.

5. I also wanted to ask you about reporting of these types of events to the media?

a. Do you adhere to a policy regarding what is reported to the media and when?
    i. For example, is there a certain point during an investigation that you would alert the media?
    ii. Are there events that would not be reported to the media?

Figure 1. Law Enforcement Events in Denver that may have had an Impact on Local Drug Markets

1999

January	February	March	April	May	June	July	August	September	October	November	December
	Seizure 119 kilos coke; seizure 262 pds of coke							22 drug traffickers arrested, including 2 kingpins		New no-knock policy implemented	

2000

January	February	March	April	May	June	July	August	September	October	November	December
	Kingpin Scott arrested				7 arrested and 23 pounds of heroin seized						

2001

January	February	March	April	May	June	July	August	September	October	November	December
						Seizure of $10 million cocaine					

2002

January	February	March	April	May	June	July	August	September	October	November	December
					Weekly sting operations in Capitol Hill	Gov. makes it a felony to stockpile meth supplies					

2003

January	February	March	April	May	June	July	August	September	October	November	December
						Bust complex of meth labs					Operation Speed Trap results in 7 arrests

III. Drug Markets in Denver and Department Practices

Lastly, I would like to discuss your local drug markets and your department's approach to addressing the problem. Table 2, below, includes tabulated responses to questions about drug purchases (for marijuana, crack/rock cocaine, powder cocaine, heroin, and crystal meth) provided by a sample of arrestees in Denver. The arrestees were interviewed between 2000 and 2003.

Table 2. Tabulations of ADAM Data (2000 to 2003: Average % for All Years)

	Drug Type				
	Marijuana	Crack/Rock Cocaine	Powder Cocaine	Heroin	Crystal Meth
Item	%	%	%	%	%
Source of Drugs					
Regular source	41	40	50	57	42
Occasional source	37	37	33	32	38
New source	22	23	17	11	19
Method of Contact					
Pager/beeper	5	5	5	12	13
Telephone	29	34	31	26	40
Go to house/apt.	19	11	17	12	21
Approach in public (e.g., street, store, park)	34	43	32	47	12
From someone at work/other social setting	12	7	14	3	11
Type of Place Where Drugs were Purchased					
House/apt.	46	34	38	18	58
Building (public or abandoned)	9	11	20	10	13
Outdoor area (e.g., street, alley, road, park, lot, etc.)	44	54	42	70	28
Neighborhood Where Drugs were Purchased					
Buyers neighborhood	43	51	40	47	48
Outside of buyers neighborhood	57	49	60	53	52

1. Now, I'd like to talk, in a little more detail, about the four items from the interviews that are included in the table above.
    a. ***Source of Drugs.*** Let's talk about the first item in the table, "source of drugs". Drug buyers were asked to report whether their last drug purchase was from a regular source, occasional source, or new source. As shown in the table most arrestees said that all five drugs were most often purchased from a regular source followed by an occasional source (between 40% and 57% and 32% and 38% of the time, respectively). Purchasing these drugs from a new source occurred less often (only

11% to 23% of the time). Do those tabulations agree with your understanding of the dealing of these drugs in Denver?

b. ***Method of Contact.*** Arrestees were also asked to report how they contacted the person they purchased the drugs from – paged the person on a beeper, called the person on a telephone and spoke directly with the person, went to a house or apartment, approached the person in public, or were they with the person already at work or in another social setting. As indicated in the table, with the exception of crystal meth buyers, most respondents said that they contacted the drug seller by approaching them in a public area (32% to 47%) followed by contacting them by telephone (26% to 34%). When purchasing crystal meth in Denver, it appears that contacting the seller via telephone (40%) followed by going to a house or apartment (21%) to buy the drugs are the most popular methods of contact. Do these data agree with your understanding of drug dealing in your city?

c. ***Type of Place where Drugs were Purchased.*** Drug buyers were also asked about the type of place where they last purchased their drugs. Response choices included: in a house or apartment, in a building (public or abandoned), or in an outdoor area. As the tabulations indicate, there is a lot of variation here by type of drug. It appears that for marijuana and powder cocaine drug purchases almost always take place in a house/apartment or outdoor area. Heroin and crack cocaine is most often purchased in an outdoor area (70% and 54% of all purchases, respectively) and crystal meth users are more likely to buy this drug in a house or apartment (58%). Do these data agree with your understanding of drug purchases in Denver?

d. ***Neighborhood where Drugs were Purchased.*** Finally, drug users were asked about the neighborhoods where they purchased drugs – did they buy drugs in their neighborhood or outside of their neighborhood? Marijuana and powder cocaine buyers, most often responded that they bought outside of their neighborhoods (57% and 60% respectively). For crack cocaine, heroin and crystal meth users, responses were fairly equal, with approximately half of all buyers responding that they purchased their drugs in either their own neighborhood or another neighborhood. Do these data agree with your understanding of drug purchases in Denver?

2. The table seems to show differences in purchase practices according to the type of drug. Can you speculate about why these differences happen?

Narratives of Law Enforcement Events in Denver

1) **2/19/99**
   2 month long initiative in Denver Public Housing called Operation Safehouse; four agencies including task force and feds involved;
   19 arrests with $77K narcotics seized in public housing; many of arrests overturned in 12/99 (and those that stuck took a year to trial).

2) **2/20/99**
   seizure of $12 million or 119 kilos of coke; Front Range TF; law enforcement claim drugs not bound for Denver

3) **2/23/99**
   Seizure of 262 lbs of cocaine with street value of $12 million through Drug Task Force activity; feds also involved; Denver metro area; Mexican nationals arrested in Aurora believed to be part of larger drug ring

4) **3/1/99**
   bust by Douglas Co sheriff dpt of meth lab and confiscation of chemicals with street value of $300K; supplies to produce 20 lbs of meth; two arrests

5) **3/26/99**
   Sweeps/Initiative by Task Force
   Announcement of initiative to begin later in the year called D-day for drugs and funded through grants totalling $1 million; involves 100 officers, etc the task force will be called Denver Front Range HIDTA and will include Denver police, FBI, CoBI, State Patrol, Arapahoe County Sheriffs Dept , INS, Customs, IRS, US Attorney's office

6) **9/23/99**
   3 Denver drug rings "crippled"-
   22 arrests and seizures; arrests include 2 drug "kingpins"
   drugs—coc, crack meth and marijuana seizures included 85 lbs marijuana, small amounts of other drugs leaders identified as local gang members
   Aurora task force, metro gang task force, federal agents participating

7) **10/2-99**
   Colorado Springs gang task force scaled back, removing 10 local officers and 2 FBI; scaled back because less gang activity

8) 10/9/99
   Dismantling a local motorcycle gang (Sons of Silence)involved in meth manufacture; chapters cover Commerce city, Ft Collins and Colorado Springs.
   39 arrests and seizure of $, guns and 10 lbs of meth
   Operation lasted 2 years
   involved 250 law enforcement agents including ATF, DEA and Colorado Springs PD
   at trial stage, many found not to be in SOS gangs and only suspect tired was acquitted

9) **11/10/99**
   Denver PD; new no-knock policy requiring supervisor to approve all search warrants written by street officers

10) 12/7/99

Removing/ indictment of gang leaders
Six people indicted from CRIPS gangs said to be involved in drug trafficking. Arrests include founding leader of local gang; first use of racketeering statute (Colorado Organized Crime Act) to make arrest
Result of a 2 ½ year probe by DPD, DEA and Denver DA office

11) 2/9/00
Kingpin arrest
Cocaine kingpin arrested in raid; Broderick Scoot seen as leader of gang that dealt cocaine

12) 2/2000
Bust of meth lab; Denver SWAT, West Metro TF and Feds; "large" lab in Co history; 10 grams of meth seized

13) 3/10/00
DPD-Police policy changes to require detective to watch undercover or drug informant activity of rookies

14) 4/4/00
Legislation changing no knock process to require prosecutors approval before obtaining no knock warrant

15) 6/16/00
Heroin arrests
7 in Denver arrests as part of nationwide initiative by feds to disrupt Mexican heroin trade in area; 23 lbs of heroin, including Mexican black tar; Mexican distribution ring working in 20 cities including Denver
DPD and federal agents involved

16) 12/17/00
Housing project initiation to reduce crime In Five Points area of Denver
2 year campaign started with federal funds 9/98-9/2000
undercover sting operations, extra patrols, surveillance camera, neighborhood watch

17) 4/10/01
6 month trafficking investigation by DEA and Jeff Co Sheriffs Office; 22 arrests, mostly under 21; cocaine, meth and marijuana

18) 7/24/01
seizure of $10 million worth of cocaine
102 kilos in Denver and Aurora from Mexican
DEA, INS, Denver PD, and Aurora PD

19) 9/13/01
gang leader of drug trafficking ring arrested in Denver with10 lbs cocaine, 2 oz meth and 220 lbs marijuana

20) 9/27/01
Lab raids
Adams Co.; 5 meth labs raided by N. Metro task force, 10 arrests, no seizure amount specified

21) 5/23/02
Indictment of nine gang (Gangster Disciples) members; distributors of crack in Aurora and east Denver

22) 6/7/02
State senate bill limiting Sudafed supplies signed

23) 6/24/02
Weekly sting operations in one area (Capital Hill) for prostituting and drugs; Aurora and Lakewood PDs
patrol unit used called ESCORT (Eliminate Street Crime on Residential Thoroughfares) use fines, arrests, vehicle confiscation

24) 7/02
Governor signed legislation making it a felony to stockpile large quantities of products to make meth; or to possess equipment, equipment, supplies, or chemicals to make meth.

25) 8/27/02
Disbanding of gang prosecution unit for budgetary reasons

26) 2/9/03
Arrest of leader of large Denver cocaine ring, charged under kingpin statute

27) 6/19/03
Vietnamese gangs broken up
Viet Pride Gangsters involved in drug trafficking; 23 arrested; meth and marijuana; Denver PD, DEA, CoBI, county police, attny general all joined in effort

28) 7/17/03
bust of large complex of labs; "thousands of dollars" worth of finished meth seized ; Adams Co SWAT and N. Metro Task force

29) 9/9/03
Supreme Court ruling to limit life span of probable cause to establish grounds for raid

30) 12/16/03
International meth ring arrests
7 international dealers arrested as result of 18 months probe called Operation Speed Trap; mid level dealers with $500K of meth, 1 lb coc, 3 oz heroin and 5 lbs marijuana
Metro West Task Force, DEA and Jeff Co DA involved

Appendix 3

Description	Local Perception of Impact	Location (ADAM Site)	Date
2 month long initiative in Denver Public Housing called Operation Safehouse; 19 arrests with $77K narcotics seized in public housing; many of arrests overturned in 12/99 (and those that stuck took a year to trial).	low	Denver	19-Feb-99
Seizure of $12 million or 119 kilos of coke; law enforcement claim drugs not bound for Denver; Mexican nationals arrested in Aurora believed to be part of larger drug ring	med	Denver	21-Feb-99
bust by Douglas County Sheriff of methlab; confiscation of chemicals with street value of $300K; supplies to produce 20 lbs of meth; 2 arrests	low	Denver	01-Mar-99
task force will be called Denver Front Range HIDTA and will include Denver police, FBI, CoBI, State Patrol, Arapahoe County Sheriffs Dept , INS, Customs, IRS, US Attorney's office, and funded through grants totaling $1 million	low	Denver	26-Mar-99
3 Denver drug rings "crippled"; 22 arrests and seizures; arrests include 2 drug "kingpins"; leaders identified as local gang members	high	Denver	23-Sep-99
Colorado Springs gang task force scaled back, removing 10 local officers and 2 FBI; scaled back because less gang activity	low	Denver	02-Oct-99
new no-knock policy for Denver PD, supervisor must approve all search warrants written by street officers	medium	Denver	10-Nov-99
Cocaine kingpin arrested in raid	medium	Denver	09-Feb-00
meth lab bust; "largest lab in CO history"	low	Denver	01-Feb-00
Policy change - detectives required to watch undercover or drug informant activity of rookies	low	Denver	10-Mar-00
legislation changing no knock process to require prosecutor's approval before obtaining no knock warrant	low	Denver	04-Apr-00
7 Denver arrests as part of nationwide federal initiative to disrupt Mexican heroin trade, 20 cities including Denver	high	Denver	16-Jun-00
housing project initiation to reduce crime, 2 year campaign started with federal funds 9/98-9/2000; undercover stings, extra patrols, surveillance cameras, neighborhood watch	low	Denver	17-Dec-00
seizure of cocaine in Denver/Aurora from Mexico	medium	Denver	24-Jul-01

Description	Local Perception of Impact	Location (ADAM Site)	Date
leader of trafficking ring arrested with drugs in possession	medium	Denver	13-Sep-01
state senate bill limiting Sudafed supplies signed into law	low	Denver	07-Jun-02
weekly stings on one area (capital hill) for prostitution and drugs; fines, arrests, vehicle confiscation	medium	Denver	24-Jun-02
governor signed legislation making it a felony to stockpile meth chemicals, posses equipment, supplies, and chemicals related to meth production	high	Denver	01-Jul-02
leader of large Denver cocaine ring arrested charged under kingpin statute	low	Denver	09-Feb-03
bust of large complex of meth labs	high	Denver	17-Jul-03
supreme court ruling to limit life span of probable cause to establish grounds for raid	low	Denver	09-Sep-03
international meth ring arrests	high	Denver	16-Dec-03
indictment of 8 people in Las Vegas, scheme to possess and distribute pseudo ephedrine (chemical for meth); prosecutors seeking forfeiture of $1 million bank account in St. George and additional assets of $5.5 million; arraignment 10/19/2001		Las Vegas	12-Oct-01
Clark County designated as a High Intensity Drug Trafficking Area		Las Vegas	05-Feb-01
dismantling of organization that supplied narcotics to about a dozen gangs in the LV area; claims that organization dealing 5 kilos of crack/week in April, but now only selling marijuana and multi-ounce quantities of crack. Major drug dealers targets		Las Vegas	12-Dec-03
closed a million dollar drug smuggling operation between Mexico and Arizona; 2 of 11 arrested were juveniles.		Phoenix	26-Jun-03
raid of West Phoenix apartment complex		Phoenix	12-Aug-03
seizure of 25 pounds of cocaine, sold more than $1 million in drugs in April		Phoenix	27-Jul-01
arrest and seizure in West Phoenix residence, part of a DEA investigation		Phoenix	09-Jan-03
routine traffic stop leads to seizure of 33 kilos of cocaine		Phoenix	18-Jan-02
raid at Innovative Waste Utilization LLC plant, estimated 500 pounds of meth kept off street due to raid		Phoenix	26-Feb-03
raids on Scottsdale nightclubs, seized $600,000 of drugs, cash, and vehicles		Phoenix	23-Sep-03

Description	Local Perception of Impact	Location (ADAM Site)	Date
new special agent in charge of DEA; "narcotics and seizures may drop in AZ under his supervision b/c he pushed agents to go after top drug lords instead of small shipments and street dealers."		Phoenix	17-Sep-02
"authorities have smashed the New Mexican mafia by putting all its key leaders behind bars"; "dramatic reduction in Maricopa County drug sales, especially in Guadalupe" as a result		Phoenix	23-Feb-00
seizure of major amounts of cocaine, heroin, marijuana, and millions in cash; "claimed at least one victory in America's war on drugs"		Phoenix	21-Jan-00
arrest of 34 mid-level dealer suspects, including 1 kingpin; second prong of July operation where 42 people were arrested		Phoenix	30-Sep-99
federal indictments unsealed, suspected of trafficking 30 pounds of black tar heroin into valley and 100 pounds of cocaine during investigation, "a tremendous, significant heroin distribution ring"		Phoenix	17-Sep-99
arrest of 32 midlevel traffickers; "major drug ring in this northeastern enclave of the state."		Phoenix	31-Jul-99
meth superlab bust in dessert near Phoenix, DEA said "record amount for an Arizona urban area", charges of manufacturing and trafficking drugs, 3 month investigation will continue		Phoenix	22-Sep-99
Robles area in central Phoenix, undercover operation, to set up multiple buys and list neighborhoods as victims so residents can testify and persuade judge to give stiff prison sentences		Phoenix	21-Sep-00
arrest of 2 meth lab suppliers alleged to have smuggled $1.6 million of pseudo ephedrine into Phoenix		Phoenix	18-Aug-00
3 month undercover investigation into sale of crystal meth completed, 56 felony and 17 misdemeanor arrests, involved strike force if more than 15 federal, state, and local agencies, seized meth, cocaine, heroin, mj with street value of $14 million		Sacramento	10-Oct-03
nine suspects arrested from "major drug distribution organization" investigation culminated in arrest of head of meth manufacturing org, 5 taskforces were involved		Sacramento	26-May-02
Sac PD withdrawing 4 officers from joint narcotics task force (HIDTA, Cal Multi-Jurisdictional Meth Enforcement Team, and Crack Roch Impact Program). Want to focus more on street level narcotic trafficking by targeting property crime		Sacramento	17-Dec-02

Description	Local Perception of Impact	Location (ADAM Site)	Date
Four meth cooks who were producing $2 million in drugs in Meadowview garage "superlab" found guilty. At arrest found 32 gallons of liquid meth, enough to make 96 lbs of meth. Sentencing on 6/6/2003.		Sacramento	08-May-03
multi-agency investigation, seizure of 100 pounds of cocaine and 20 arrests, "largest bust in department history", investigation led by Sacramento County Sheriff		Sacramento	16-May-02
8 men captured suspected of producing meth lab in Corning, seized 36 lbs, drug lab capable of producing 50 pounds at one time		Sacramento	22-Mar-03
marijuana garden bust in El Dorado National Forest, 1169 plants and 22 lbs of processed marijuana confiscated, street value of $4.4 million		Sacramento	15-Oct-02
"local drug kingpin responsible for bringing significant amounts of cocaine, meth, and marijuana into Utah" sentenced to 15 years in fed prison. Arrested 6/2000 "admitted leadership in organization bringing money and drugs from Mexico and CA."	medium	Salt Lake City	09-May-03
arrest of narcotics smugglers, ferried rugs through SLC Airport, planned to put more than 50 lbs of coke on streets of UT, AK, WA. "amount of meth seized was the largest bust in recent memory" 7 lbs of pure meth, which could be made into 22 lbs meth	low to medium	Salt Lake City	04-Nov-01
arrests of cocaine and meth traffickers, "this was a major operation", nationwide (also in NY, Phoenix, Providence, LA, and other cities), nationwide 240 people arrested over past 19 months	medium	Salt Lake City	01-Aug-03
Cannonville lab (Garfield County), "producing 1 pound of meth/week", Central Utah narcotics TF, Garfield, Sevier, Wayne County Sheriffs, Utah Highway Patrol1 pound of liquid meth and several ounces of meth	low	Salt Lake City	19-Feb-99
Washington County home raided, 2 arrests, 25-40 gallons of meth oil and an ounce of finished meth	medium	Portland	11-Jan-03
6 homes raided in NE and SE Portland, Tigard, and Woodburn. "Took out a distribution ring with the potential to supply half the heroin addicts in the metro area." "found evidence ring was bringing 15 kilos of heroin to Portland/month."	medium	Portland	27-Nov-02
raid of "unusually large, long-running met factory and extensive evidence of identity theft." "Lab is larger than the majority of ones we seize in Oregon."	medium	Portland	29-Jul-02

Description	Local Perception of Impact	Location (ADAM Site)	Date
raids, found at least 6 tiny bundles of tar heroin, 29 Hondurans arrested, another 24 illegal immigrants, confiscated several thousand dollars in drug profits	low	Portland	07-Jan-99
6 charged in district court, transporting and selling pseudo ephedrine, 2/2001 130 pounds of pseudo ephedrine was picked up from airborne express, 6/2002 crossed into Canada with 191 lbs, 12/2002 crossed border with 36 lbs, raids of 10 homes	medium	Portland	02-Jul-03
raid and 40 arrests in East Palo Alto, seized crack and black tar heroin. "DEA would follow up on operation in the coming months, charting the street corners, community complaints, drug arrests, and recidivism to measure effectiveness."		San Jose	09-Aug-00
seizure of meth during sting operation		San Jose	13-Oct-99
meth lab bust "biggest illegal drug operation in Los Gatos." PD looking for people who set it up. 50 pounds of raw material was in the process of being cooked into meth		San Jose	12-Jan-00
arrest and seizure of cocaine in Oakland and Pittsburgh, "worth millions of dollars on the street."		San Jose	16-Dec-00
indictment of 6 men in heroin smuggling ring that brought 178 pounds (worth 5-8 mil) into the Bay area from Mexico over the past four years.		San Jose	12-Feb-00
raid on drug lab, arrests made, confiscated 8 pounds of meth and enough chemicals to make another 125 pounds		San Jose	04-Sep-00
raid of home near Hollister, seizure of meth, "one of the area's largest meth busts"		San Jose	13-Feb-01
San Jose man arrested for allegedly possessing $450,000 worth of ice; Santa Clara County Specialized Enforcement Team; 7 pounds of ice found		San Jose	11-Mar-03
raid of homes in Menlo Park and East Palo Alto, arrest of 4 believed to be a major meth cell responsible for distributing large amounts in CA and WA. 4 others arrested earlier and one suspect at large.		San Jose	26-Feb-03
4 men arrested and another sought by authorities, 4 pounds of heroin buried outside E. San Jose home		San Jose	22-Mar-02
"one of Alameda County's largest seizures if black tar heroin." Potential street value of 1.4 mil, 10 arrested for roles in distribution ring from Mexico to East Bay, Los Angeles, and the Midwest		San Jose	26-Mar-01

Description	Local Perception of Impact	Location (ADAM Site)	Date
arrest of 4 dealers, seizure of 15 pounds of meth, "largest undercover bust in a decade"		San Jose	07-Oct-00
San Mateo County Narcotics TF seized more than $800,000 in meth during a sting operation that ended with one arrest, 11 pounds of meth seized		San Jose	13-Oct-99
"One of San Mateo County's largest meth hauls." Redwood City, 1 arrest, 17 pounds of meth seized, called to home when resident chased off a would be burglar with an assault rifle		San Jose	20-Apr-99
Customs seized $5.2 mil in cocaine and $750000 in cash, 2 arrested involved with cross border smuggling operation		San Diego	14-Jun-02
12 arrested and $200000 in heroin seized		San Diego	08-Mar-02
18 month investigation in North County, arrest of high ranking Vista gang member, and seizure of 5 pounds of black tar heroin, 10 arrests, including high ranking members of Vista Home Boys		San Diego	13-Nov-03
18 month investigation into north County drug ring (Delia Ramos Org), indictments against 20 suspected of trafficking meth and heroin		San Diego	10-Nov-00
raids of residences, ended 5 month investigation that resulted in seizure of 18 pounds of meth, 78 grams of heroin, 157 pounds of mj. "24 arrests would crush two local gangs responsible for the lion's share of drug-related violence in the city."		San Diego	26-Aug-00
indictment of 100 people, including 13 in SD for pseudo ephedrine sales. Operation has resulted in 300 arrests and seizure of ingredients for up to 18000 pounds of meth over 3 years.		San Diego	11-Jan-02
seizure of 400 pounds of meth, largest drug lab in riverside county, super lab, run by Mexican Drug Traffickers		San Diego	17-Jun-00
sweep arrested 21 gang members		San Diego	31-Aug-00
meth and nj seizure, 11 arrests. Over course of investigation 35 pounds of meth and 28 pounds of mj seized, North County		San Diego	05-Oct-00
over 8 months, 100 drug buys and 79 suspects arrested in undercover op aimed at ridding downtown of street dealers and drugs		San Diego	10-Jan-03
34 indicted on federal felony charges, including drug conspiracy counts, seized at least 1 pound of cocaine, gang sold 44 pounds of crack on streets of SD		San Diego	09-Mar-02

Description	Local Perception of Impact	Location (ADAM Site)	Date
Dea pulled out of 3 SD-based TF's because of shift in law enforcement tactics. New strategy calls for more investigations of upper echelon drug traffickers.		San Diego	01-Sep-01
Raid in Tucson Northwest Side; 500 pounds of cocaine seized; street value as high as $10 million; Mexican man arrested and charged with possession of a controlled substance with intent to distribute.	low	Tucson	11-Jan-02
25 arrest warrants led to arrest of 24 alleged gang members accused of selling up to $500,000 worth of cocaine a week; DEA claim members were of 4 different gangs; Officers seized a few pounds of cocaine, among cash, vehicles, and other items.	low	Tucson	03-Sep-99
New special agent in charge of DEA; "narcotics arrests and seizures may drop in AZ under his supervision b/c he pushed agents to go after top drug lords instead of small shipments and street dealers."		Phoenix	17-Sep-02
DEA event		New York	8/25/1999
DEA event		Albuquerque	3/1/2000
DEA event		Los Angeles, Denver, San Diego, Portland	8/1/2000
DEA event		Philadelphia	1/18/2001
DEA event		Laredo, San Antonio, Dallas, Tulsa, Chicago, New York City, Charlotte, Detroit, Atlanta, Cleveland	8/1/2001
DEA event		Albany, Los Angeles, New York City	8/1/2001
DEA event		Los Angeles, Dallas, Las Vegas, Portland	9/26/2001
DEA event		Los Angeles, Las Vegas, San Diego, Phoenix, Sacramento	1/10/2002

Description	Local Perception of Impact	Location (ADAM Site)	Date
DEA event		New York City	7/1/2002
DEA event		Detroit, Chicago, Los Angeles, New York City	4/15/2003
DEA event		Los Angeles, Chicago, New York City, phoenix, salt lake City	7/31/2003
DEA event		Houston, Chicago, New York City	12/14/2000
DEA event		Atlanta, New York City, Philadelphia	4/13/2000
State and local agents shut down highly sophisticated drug-dealing operation in Shasta County; over-prescription of ocycodone; State Bureau of Medi-Cal Fraud, State Bureau of Narcotic Enforcement, Shasta Interagency Narcotics TF		Sacramento	2/19/1999
7 suspects in custody & 2 men fugitives after series of Central Valley drug raids; "officials say would make a major dent in the flow of drugs in CA"; seizure of street drugs worth several million dollars; tip from Modesto police detective Fernandez		Sacramento	4/22/1999
crackdown on narcotics & violent offenders in Yuba & Sutter counties ended with arrests & seizure of illicit drugs with street value of more than $210,000; 16 federal, state and local authorities involved; 232 searches, seizure of 15 meth labs		Sacramento	6/1/1999
authorities "toppled a sophisticated drug ring that distributed methamphetamines and mh throughout the Sacramento rings;" suspects have alleged ties to to a Mexican drug operation; drugs, firearms and cash seized		Sacramento	9/10/1999
meth distribution ring dismantled; agents involved from Yolo Narcotic Enforcement Team, State Bureau of Narcotic Enforcement-Sacramento Regional Office, and Folsom PD; seizure had street value of $250,000		Sacramento	10/29/1999
Sacramento narcotics agents hauled 1/2 million dollars worth of meth off the street; info developed by HIDTA led to stop of a car with duffel bag of meth; street value $500,000		Sacramento	3/8/2000

Description	Local Perception of Impact	Location (ADAM Site)	Date
weeklong sting operation by consortium of cops against a Valley meth maker sting using a confidential informant; HIDTA encompasses 10 local, state and federal agencies; seizure of 8 pounds of meth		Sacramento	10/8/2000
largest bust in department history; "this was a major distribution ring, we have absolutely broken the back of this organization;" Investigation spearheaded by CA Multijurisdictional Methamphetamine Enforcement Team and Central Valley High Intensity		Sacramento	5/18/2002
Arrest of 2 Washington men and confiscation of 3 suitcases with 127lbs of cocaine with street value at $4.5mil; Anderson PD, who called in the CA Multi-jurisdictional Methamphetamine Enforcement Team		Sacramento	5/31/2003
9 people received federal indictments for allegedly dealing cocaine in South Sacramento; result of 3-month investigation in Franklin Villa that teamed Sacramento PD with DEA ; during operation 31 people arrested, officers seized cocaine & other drugs		Sacramento	10/4/2002
DEA, PPB, and ROCN Operation Pseudo Chill that focused on sale of pseudo ephedrine by convenience store owners, resulting in 7 or 8 arrests	high	Portland	7/1/2001
seizure of 10 pounds of heroin by PPB	high	Portland	2/1/2002
ROCN task force seized 5 pounds of heroin and indicted 24 subjects	medium	Portland	2/1/2001
PPB seized 11 kilos of cocaine and $157,000 and arrested 4 or 5 people	high	Portland	3/15/2002

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Figure 1 – Summary of Enforcement Data across Ten Counties 1999-2003

Figure 1

City	1999 J	1999 F	1999 M	1999 A	1999 M	1999 J	1999 J	1999 A	1999 S	1999 O	1999 N	1999 D	2000 J	2000 F	2000 M	2000 A	2000 M	2000 J	2000 J	2000 A	2000 S	2000 O	2000 N	2000 D	2001 J	2001 F	2001 M	2001 A	2001 M	2001 J	2001 J	2001 A	2001 S	2001 O	2001 N	2001 D	2002 J	2002 F	2002 M	2002 A	2002 M	2002 J	2002 J	2002 A	2002 S	2002 O	2002 N	2002 D	2003 J	2003 F	2003 M	2003 A	2003 M	2003 J	2003 J	2003 A	2003 S	2003 O	2003 N	2003 D
Denver	C	M					M J		C M				M					H											C		C M J																				C				M						C H M J
Las Vegas																																H					M																								C
New York								C H															C J							C H M J												C H J											M			C H M J							
Phoenix						C			C H M				C H J					M											C M							C M												C	M			C H M		C H M J		C H M J		C H				
Portland	C H												M	H				M							H				M		H					C			M				H				M													
Sacramento					M			M J														M																	C M				C J							M		C M					C H M J				
Salt Lake City	M																						M																											C M J			C H M J		C M							
San Diego											M						M		H M J		J		H M													M		C H		C																					H M
San Jose			M						M				H M						C H		M	M		C	M		C H M											H												M	M										
Tucson									C																												C																							

Legend
C - Cocaine
H - Heroin
M - Methamphetamine
J - Marijuana

Figure 2 – Crack Cocaine in New York: Probability that a Drug Market Transaction is with a New Source (Open Transaction) as a Function of Time After the Enforcement Event For Three Assumptions about the Maximum Length of Enforcement Effectiveness

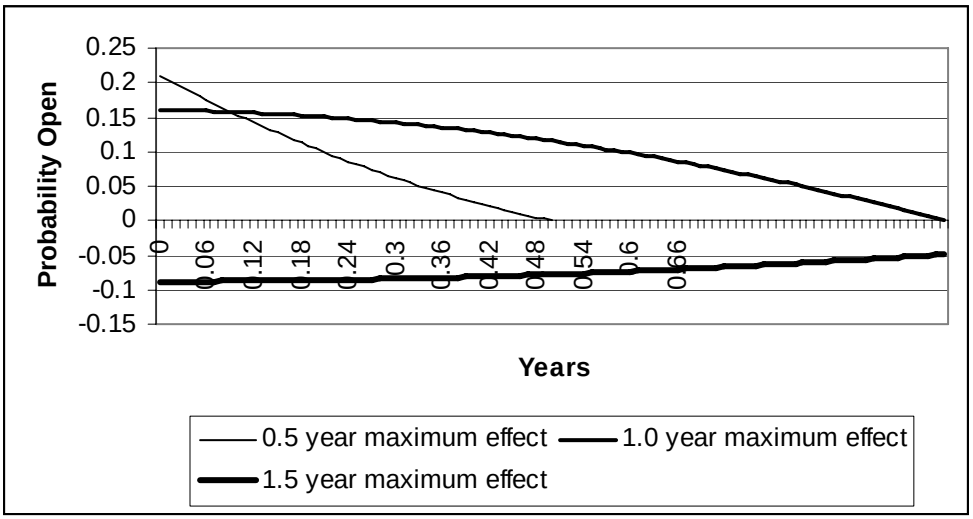

Figure 3 – Cocaine in New York: Probability that a Drug Market Transaction is with a New Source (Open Transaction) As a Function of Time After the Enforcement Event For Three Assumptions about the Maximum Length of Enforcement Effectiveness

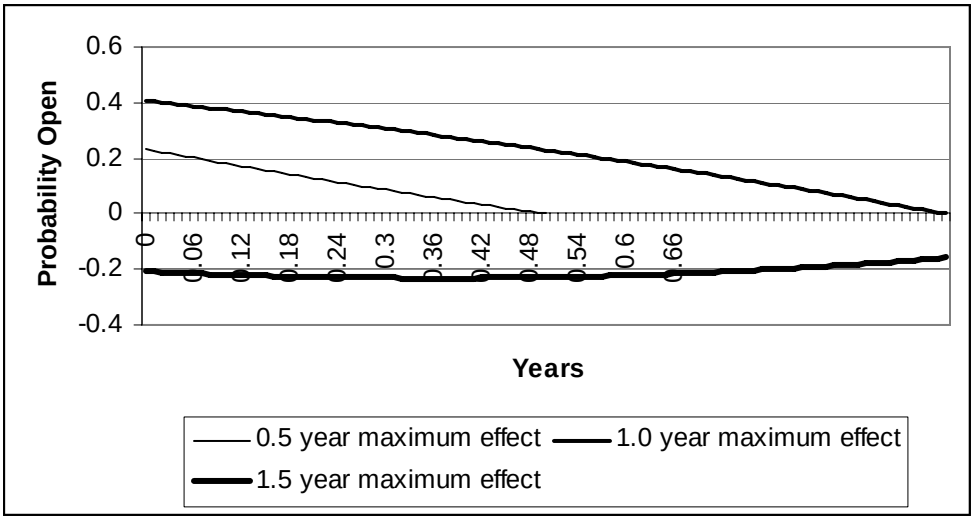

Figure 4 – Heroin in New York: Probability that a Drug Market Transaction is with a New Source (Open Transaction) As a Function of Time After the Enforcement Event For Three Assumptions about the Maximum Length of Enforcement Effectiveness

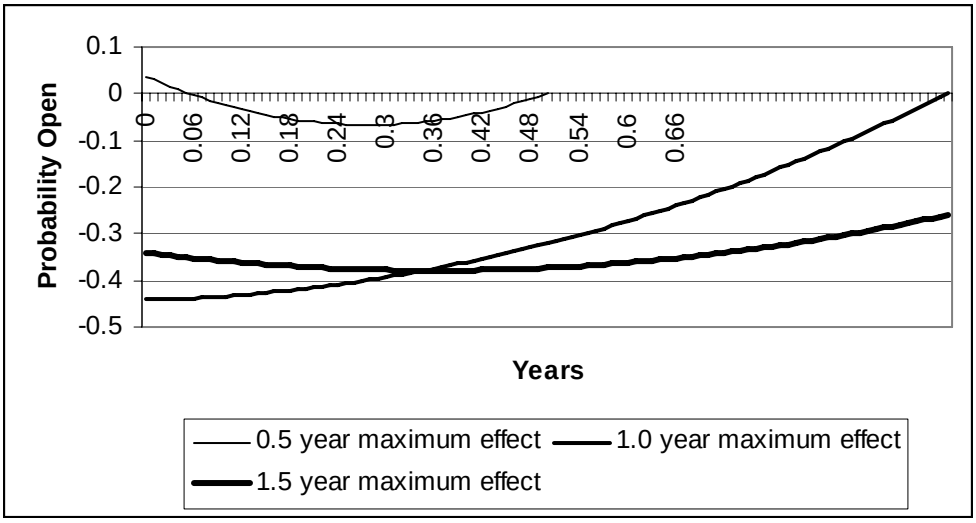

Table 1 – Raw Percentage Frequencies of Market Variables by County and Drug

	Denver	LasVegas	NewYork	Phoenix	Portland	Sacramento	Salt Lake City	SanDiego	SanJose	Tucson
Crack Cocaine										
Source	(n=344)	(n=424)	(n=638)	(n=694)	(n=280)	(n=251)	(n=107)	(n=163)	(n=145)	(n=312)
Regular	41.3	47.2	55.3	61.2	48.6	40.6	62.6	40.5	40.0	52.9
Occasional	35.8	34.4	36.4	20.9	33.6	39.8	26.2	34.4	40.7	24.7
New	23.0	18.4	8.3	17.9	17.9	19.5	11.2	25.2	19.3	22.4
Contact	(n=340)	(n=418)	(n=634)	(n=690)	(n=276)	(n=252)	(n=104)	(n=162)	(n=146)	(n=304)
Page/Phone	39.7	23.4	8.2	21.6	43.5	21.8	62.5	29.6	34.2	42.1
House	11.8	28.0	7.4	49.7	10.9	29.8	17.3	22.2	10.3	29.3
Work	6.5	5.5	1.3	3.8	4.0	4.8	10.6	3.7	10.3	6.3
Public	42.1	43.1	83.1	24.9	41.7	43.7	9.6	44.4	45.2	22.4
Location	(n=340)	(n=420)	(n=636)	(n=688)	(n=279)	(n=251)	(n=102)	(n=160)	(n=146)	(n=307)
House	35.0	43.1	9.3	63.8	31.9	44.2	62.7	35.6	31.5	57.7
Public Building	12.1	8.8	6.0	9.2	9.7	9.6	10.8	10.6	18.5	13.4
Other Public Place	52.9	48.1	84.7	27.0	58.4	46.2	26.5	53.8	50.0	29.0
Neighborhood	(n=345)	(n=419)	(n=631)	(n=692)	(n=279)	(n=252)	(n=107)	(n=163)	(n=146)	(n=314)
Outside	47.8	53.9	38.5	44.9	54.5	50.8	59.8	52.8	71.2	56.4
Within	52.2	46.1	61.5	55.1	45.5	49.2	40.2	47.2	28.8	43.6
Powder Cocaine										
Source	(n=200)	(n=219)	(n=423)	(n=335)	(n=214)	(n=58)	(n=185)	(n=77)	(n=103)	(n=298)
Regular	50.5	67.1	67.4	67.2	59.8	60.3	57.8	58.4	53.4	64.4
Occasional	32.5	17.8	26.2	22.7	24.3	24.1	22.7	19.5	33.0	21.1
New	17.0	15.1	6.4	10.1	15.9	15.5	19.5	22.1	13.6	14.4
Contact	(n=199)	(n=214)	(n=420)	(n=329)	(n=211)	(n=60)	(n=183)	(n=75)	(n=102)	(n=298)
Page/Phone	37.7	65.4	15.5	48.6	50.2	53.3	60.1	65.3	44.1	53.0
House	17.1	14.5	11.7	32.8	6.2	11.7	11.5	16.0	15.7	27.5
Work	13.6	7.5	1.0	7.0	7.6	6.7	11.5	8.0	12.7	9.4
Public	31.7	12.6	71.9	11.6	36.0	28.3	16.9	10.7	27.5	10.1
Location	(n=201)	(n=210)	(n=423)	(n=329)	(n=211)	(n=59)	(n=182)	(n=73)	(n=103)	(n=292)
House	38.3	44.3	18.7	65.7	27.5	49.2	39.6	47.9	43.7	57.5
Public Building	19.9	21.0	7.8	12.5	13.3	18.6	19.8	20.5	23.3	19.9
Other Public Place	41.8	34.8	73.5	21.9	59.2	32.2	40.7	31.5	33.0	22.6
Neighborhood	(n=202)	(n=215)	(n=417)	(n=335)	(n=212)	(n=59)	(n=185)	(n=76)	(n=103)	(n=300)
Outside	58.4	53.5	37.4	48.4	54.7	64.4	68.6	64.5	66.0	58.7
Within	41.6	46.5	62.6	51.6	45.3	35.6	31.4	35.5	34.0	41.3

	Denver	LasVegas	NewYork	Phoenix	Portland	Sacramento	Salt Lake City	SanDiego	SanJose	Tucson
Methamphetamine										
Source	(n=63)	(n=490)	(n=8)	(n=910)	(n=367)	(n=465)	(n=306)	(n=513)	(n=507)	(n=119)
Regular	44.4	58.0	87.5	61.1	49.9	54.6	51.6	55.0	52.9	64.7
Occasional	34.9	29.2	12.5	26.2	31.1	33.1	32.0	27.9	29.2	22.7
New	20.6	12.9	-	12.7	19.1	12.3	16.3	17.2	17.9	12.6
Contact	(n=61)	(n=476)	(n=9)	(n=891)	(n=361)	(n=461)	(n=299)	(n=497)	(n=502)	(n=117)
Page/Phone	52.5	56.9	44.4	50.7	53.5	48.4	64.5	52.5	60.4	53.8
House	13.1	23.5	-	30.1	18.8	27.1	20.1	22.9	13.3	34.2
Work	11.5	9.7	11.1	10.0	11.9	8.9	8.7	9.5	10.8	7.7
Public	23.0	9.9	44.4	9.2	15.8	15.6	6.7	15.1	15.5	4.3
Location	(n=63)	(n=482)	(n=9)	(n=894)	(n=363)	(n=466)	(n=302)	(n=504)	(n=502)	(n=116)
House	55.6	70.3	-	76.7	62.0	72.3	73.5	63.1	60.8	76.7
Public Building	15.9	16.2	22.2	10.4	12.1	8.4	11.6	14.1	13.1	13.8
Other Public Place	28.6	13.5	77.8	12.9	25.9	19.3	14.9	22.8	26.1	9.5
Neighborhood	(n=63)	(n=483)	(n=9)	(n=910)	(n=366)	(n=467)	(n=306)	(n=517)	(n=510)	(n=120)
Outside	49.2	61.7	66.7	52.6	51.6	50.7	74.5	53.2	64.3	50.0
Within	50.8	38.3	33.3	47.4	48.4	49.3	25.5	46.8	35.7	50.0
Marijuana										
Source	(n=554)	(n=784)	(n=1242)	(n=1149)	(n=490)	(n=694)	(n=389)	(n=523)	(n=557)	(n=459)
Regular	41.0	48.3	60.7	53.3	41.0	44.8	49.6	41.1	48.1	47.5
Occasional	36.3	32.4	31.6	31.3	38.4	36.0	30.8	41.9	33.4	34.9
New	22.7	19.3	7.6	15.4	20.6	19.2	19.5	17.0	18.5	17.6
Contact	(n=550)	(n=779)	(n=1239)	(n=1118)	(n=482)	(n=685)	(n=378)	(n=510)	(n=551)	(n=445)
Page/Phone	33.1	43.1	11.0	41.8	39.8	35.5	54.8	36.7	47.4	37.1
House	19.3	24.5	9.2	33.3	14.3	23.1	18.5	26.1	15.8	32.6
Work	12.4	11.0	2.7	10.2	18.3	11.4	13.2	12.2	14.7	10.8
Public	35.3	21.3	77.2	14.8	27.6	30.1	13.5	25.1	22.1	19.6
Location	(n=555)	(n=778)	(n=1241)	(n=1140)	(n=484)	(n=692)	(n=384)	(n=512)	(n=551)	(n=452)
House	46.5	61.6	13.8	70.4	53.1	55.9	69.8	59.4	53.2	62.6
Public Building	9.9	12.1	6.6	9.6	11.0	10.8	10.2	7.4	15.2	10.4
Other Public Place	43.6	26.3	79.6	20.1	36.0	33.2	20.1	33.2	31.6	27.0
Neighborhood	(n=557)	(n=778)	(n=1241)	(n=1149)	(n=480)	(n=699)	(n=391)	(n=520)	(n=559)	(n=457)
Outside	55.3	62.7	34.4	54.9	51.3	50.8	69.6	50.8	62.4	60.4
Within	44.7	37.3	65.6	45.1	48.8	49.2	30.4	49.2	37.6	39.6

	Denver	LasVegas	NewYork	Phoenix	Portland	Sacramento	Salt Lake City	SanDiego	SanJose	Tucson
Heroin										
Source	(n=98)	(n=118)	(n=485)	(n=253)	(n=238)	(n=104)	(n=123)	(n=102)	(n=53)	(n=97)
Regular	60.2	78.8	66.6	77.9	63.9	60.6	73.2	71.6	62.3	81.4
Occasional	28.6	13.6	27.2	15.0	20.2	26.0	14.6	16.7	26.4	11.3
New	11.2	7.6	6.2	7.1	16.0	13.5	12.2	11.8	11.3	7.2
Contact	(n=98)	(n=117)	(n=481)	(n=251)	(n=239)	(n=104)	(n=123)	(n=101)	(n=52)	(n=95)
Page/Phone	41.8	82.1	15.8	61.0	48.1	48.1	83.7	66.3	71.2	70.5
House	10.2	9.4	8.1	25.5	6.3	25.0	2.4	11.9	7.7	13.7
Work	3.1		0.8	3.2	4.6	3.8	6.5	5.0	1.9	6.3
Public	44.9	8.5	75.3	10.4	41.0	23.1	7.3	16.8	19.2	9.5
Location	(n=97)	(n=113)	(n=483)	(n=248)	(n=237)	(n=103)	(n=121)	(n=98)	(n=52)	(n=93)
House	17.5	25.7	13.9	46.8	22.8	53.4	38.0	39.8	40.4	34.4
Public Building	9.3	18.6	6.8	19.4	5.9	12.6	15.7	18.4	25.0	22.6
Other Public Place	73.2	55.8	79.3	33.9	71.3	34.0	46.3	41.8	34.6	43.0
Neighborhood	(n=98)	(n=115)	(n=482)	(n=252)	(n=238)	(n=105)	(n=124)	(n=103)	(n=54)	(n=97)
Outside	51.0	36.5	37.6	41.3	50.8	43.8	63.7	53.4	59.3	53.6
Within	49.0	63.5	62.4	58.7	49.2	56.2	36.3	46.6	40.7	46.4

Table 2 – Summary of Variables in the Analysis File

	Denver	LasVegas	NewYork	Phoenix	Portland	Sacramento	SaltLakeCity	SanDiego	SanJose	Tucson
SOURCE - Crack Cocaine	n=344	n=424	n=638	n=694	n=280	n=251	n=107	n=163	n=145	n=312
Regular	0.41	0.47	0.55	0.61	0.49	0.41	0.63	0.40	0.40	0.53
Occasional	0.36	0.34	0.36	0.21	0.34	0.40	0.26	0.34	0.41	0.25
New	0.23	0.18	0.08	0.18	0.18	0.20	0.11	0.25	0.19	0.22
SOURCE - Powder Cocaine	n=200	n=219	n=423	n=335	n=214	n=58	n=185	n=77	n=103	n=298
Regular	0.51	0.67	0.67	0.67	0.60	0.60	0.58	0.58	0.53	0.64
Occasional	0.33	0.18	0.26	0.23	0.24	0.24	0.23	0.19	0.33	0.21
New	0.17	0.15	0.06	0.10	0.16	0.16	0.19	0.22	0.14	0.14
SOURCE - Methamphetamine	n=63	n=490	n=8	n=910	n=367	n=465	n=306	n=513	n=507	n=119
Regular	0.44	0.58	0.88	0.61	0.50	0.55	0.52	0.55	0.53	0.65
Occasional	0.35	0.29	0.13	0.26	0.31	0.33	0.32	0.28	0.29	0.23
New	0.21	0.13		0.13	0.19	0.12	0.16	0.17	0.18	0.13
SOURCE – Marijuana	n=554	n=784	n=1242	n=1149	n=490	n=694	n=389	n=523	n=557	n=459
Regular	0.41	0.48	0.61	0.53	0.41	0.45	0.50	0.41	0.48	0.47
Occasional	0.36	0.32	0.32	0.31	0.38	0.36	0.31	0.42	0.33	0.35
New	0.23	0.19	0.08	0.15	0.21	0.19	0.20	0.17	0.18	0.18
SOURCE – Heroin	n=98	n=118	n=485	n=253	n=238	n=104	n=123	n=102	n=53	n=97
Regular	0.60	0.79	0.67	0.78	0.64	0.61	0.73	0.72	0.62	0.81
Occasional	0.29	0.14	0.27	0.15	0.20	0.26	0.15	0.17	0.26	0.11
New	0.11	0.08	0.06	0.07	0.16	0.13	0.12	0.12	0.11	0.07
CONTACT - Crack Cocaine	n=340	n=418	n=634	n=690	n=276	n=252	n=104	n=162	n=146	n=304
Phone or house/apartment	0.51	0.51	0.16	0.71	0.54	0.52	0.80	0.52	0.45	0.71
Work or social/public setting	0.49	0.49	0.84	0.29	0.46	0.48	0.20	0.48	0.55	0.29
CONTACT - Powder Cocaine	n=199	n=214	n=420	n=329	n=211	n=60	n=183	n=75	n=102	n=298
Phone or house/apartment	0.55	0.80	0.27	0.81	0.56	0.65	0.72	0.81	0.60	0.81
Work or social/public setting	0.45	0.20	0.73	0.19	0.44	0.35	0.28	0.19	0.40	0.19
CONTACT - Methamphetamine	n=61	n=476	n=9	n=891	n=361	n=461	n=299	n=497	n=502	n=117
Phone or house/apartment	0.66	0.80	0.44	0.81	0.72	0.75	0.85	0.75	0.74	0.88
Work or social/public setting	0.34	0.20	0.56	0.19	0.28	0.25	0.15	0.25	0.26	0.12
CONTACT – Marijuana	n=550	n=779	n=1239	n=1118	n=482	n=685	n=378	n=510	n=551	n=445
Phone or house/apartment	0.52	0.68	0.20	0.75	0.54	0.59	0.73	0.63	0.63	0.70
Work or social/public setting	0.48	0.32	0.80	0.25	0.46	0.41	0.27	0.37	0.37	0.30

	Denver	LasVegas	NewYork	Phoenix	Portland	Sacramento	SaltLakeCity	SanDiego	SanJose	Tucson
CONTACT – Heroin	n=98	n=117	n=481	n=251	n=239	n=104	n=123	n=101	n=52	n=95
Phone or house/apartment	0.52	0.91	0.24	0.86	0.54	0.73	0.86	0.78	0.79	0.84
Work or social/public setting	0.48	0.09	0.76	0.14	0.46	0.27	0.14	0.22	0.21	0.16
LOCATION - Crack Cocaine	n=340	n=420	n=636	n=688	n=279	n=251	n=102	n=160	n=146	n=307
House/apartment	0.35	0.43	0.09	0.64	0.32	0.44	0.63	0.36	0.32	0.58
Public/abandoned building	0.12	0.09	0.06	0.09	0.10	0.10	0.11	0.11	0.18	0.13
Street/open area	0.53	0.48	0.85	0.27	0.58	0.46	0.26	0.54	0.50	0.29
LOCATION - Powder Cocaine	n=201	n=210	n=423	n=329	n=211	n=59	n=182	n=73	n=103	n=292
House/apartment	0.38	0.44	0.19	0.66	0.27	0.49	0.40	0.48	0.44	0.58
Public/abandoned building	0.20	0.21	0.08	0.12	0.13	0.19	0.20	0.21	0.23	0.20
Street/open area	0.42	0.35	0.74	0.22	0.59	0.32	0.41	0.32	0.33	0.23
LOCATION - Methamphetamine	n=63	n=482	n=9	n=894	n=363	n=466	n=302	n=504	n=502	n=116
House/apartment	0.56	0.70		0.77	0.62	0.72	0.74	0.63	0.61	0.77
Public/abandoned building	0.16	0.16	0.22	0.10	0.12	0.08	0.12	0.14	0.13	0.14
Street/open area	0.29	0.13	0.78	0.13	0.26	0.19	0.15	0.23	0.26	0.09
LOCATION - Marijuana	n=555	n=778	n=1241	n=1140	n=484	n=692	n=384	n=512	n=551	n=452
House/apartment	0.46	0.62	0.14	0.70	0.53	0.56	0.70	0.59	0.53	0.63
Public/abandoned building	0.10	0.12	0.07	0.10	0.11	0.11	0.10	0.07	0.15	0.10
Street/open area	0.44	0.26	0.80	0.20	0.36	0.33	0.20	0.33	0.32	0.27
LOCATION - Heroin	n=97	n=113	n=483	n=248	n=237	n=103	n=121	n=98	n=52	n=93
House/apartment	0.18	0.26	0.14	0.47	0.23	0.53	0.38	0.40	0.40	0.34
Public/abandoned building	0.73	0.56	0.79	0.34	0.71	0.34	0.46	0.42	0.35	0.43
Street/open area	0.09	0.19	0.07	0.19	0.06	0.13	0.16	0.18	0.25	0.23
NEIGHBORHOOD - Crack Cocaine	n=345	n=419	n=631	n=692	n=279	n=252	n=107	n=163	n=146	n=314
Neighborhood	0.52	0.46	0.61	0.55	0.46	0.49	0.40	0.47	0.29	0.44
Not neighborhood	0.48	0.54	0.39	0.45	0.54	0.51	0.60	0.53	0.71	0.56
NEIGHBORHOOD - Powder Cocaine	n=202	n=215	n=417	n=335	n=212	n=59	n=185	n=76	n=103	n=300
Neighborhood	0.42	0.47	0.63	0.52	0.45	0.36	0.31	0.36	0.34	0.41
Not neighborhood	0.58	0.53	0.37	0.48	0.55	0.64	0.69	0.64	0.66	0.59
NEIGHBORHOOD - Methamphetamine	n=63	n=483	n=9	n=910	n=366	n=467	n=306	n=517	n=510	n=120
Neighborhood	0.51	0.38	0.33	0.47	0.48	0.49	0.25	0.47	0.36	0.50
Not neighborhood	0.49	0.62	0.67	0.53	0.52	0.51	0.75	0.53	0.64	0.50
NEIGHBORHOOD - Marijuana	n=557	n=778	n=1241	n=1149	n=480	n=699	n=391	n=520	n=559	n=457

	Denver	LasVegas	NewYork	Phoenix	Portland	Sacramento	SaltLakeCity	SanDiego	SanJose	Tucson
Neighborhood	0.45	0.37	0.66	0.45	0.49	0.49	0.30	0.49	0.38	0.40
Not neighborhood	0.55	0.63	0.34	0.55	0.51	0.51	0.70	0.51	0.62	0.60
NEIGHBORHOOD - Heroin	n=98	n=115	n=482	n=252	n=238	n=105	n=124	n=103	n=54	n=97
Closed	0.49	0.63	0.62	0.59	0.49	0.56	0.36	0.47	0.41	0.46
Not neighborhood	0.51	0.37	0.38	0.41	0.51	0.44	0.64	0.53	0.59	0.54
EXPERIENCE[1, 2] - Crack Cocaine	n=609	n=666	n=737	n=1139	n=525	n=420	n=338	n=304	n=277	n=556
	6.45	9.11	15.13	9.30	7.35	7.95	4.10	6.72	5.59	8.39
	(6.72)	(7.09)	(6.58)	(7.40)	(6.89)	(6.50)	(6.67)	(6.89)	(6.73)	(6.88)
EXPERIENCE[1, 2] - Powder Cocaine	n=514	n=551	n=591	n=983	n=434	n=206	n=459	n=295	n=366	n=726
	2.87	4.62	8.81	2.18	5.15	1.47	3.85	1.83	1.74	2.75
	(4.21)	(4.87)	(4.98)	(4.22)	(4.77)	(3.82)	(4.37)	(3.59)	(3.70)	(4.13)
EXPERIENCE[1, 2] - Methamphetamine	n=202	n=1089	n=25	n=1884	n=807	n=871	n=726	n=1030	n=1077	n=349
	2.54	4.78	2.35	5.05	4.37	5.47	4.90	4.94	3.83	3.42
	(3.70)	(3.82)	(3.90)	(3.94)	(3.79)	(3.73)	(3.92)	(3.84)	(3.79)	(4.02)
EXPERIENCE[1, 2] - Marijuana	n=1433	n=1998	n=1743	n=3087	n=1457	n=1508	n=1163	n=1446	n=1407	n=1298
	2.49	2.70	11.70	2.01	2.54	4.61	1.81	2.22	2.78	1.98
	(2.61)	(2.70)	(2.55)	(2.71)	(2.64)	(2.64)	(2.70)	(2.70)	(2.70)	(2.70)
EXPERIENCE[1, 2] - Heroin	n=160	n=199	n=570	n=406	n=374	n=178	n=215	n=221	n=108	n=173
	12.49	12.23	17.47	13.51	12.74	11.44	10.45	10.24	10.42	12.22
	(10.20)	(10.11)	(8.66)	(10.33)	(9.94)	(9.88)	(10.19)	(10.05)	(10.27)	(10.81)
AGE[1]	n=2892	n=4330	n=3491	n=6395	n=2852	n=2589	n=2643	n=2959	n=3173	n=2511
	32.41	33.33	30.98	30.92	32.82	32.36	31.33	32.31	31.62	31.74
	(11.53)	(11.19)	(15.14)	(10.86)	(10.61)	(11.16)	(11.03)	(10.63)	(11.22)	(12.10)
ETHNICITY	n=2892	n=4331	n=3496	n=6395	n=2851	n=2589	n=2643	n=2959	n=3173	n=2511
White	0.29	0.54	0.11	0.58	0.66	0.42	0.68	0.39	0.30	0.45
Black	0.28	0.28	0.59	0.12	0.24	0.35	0.06	0.21	0.12	0.12
Hispanic	0.39	0.15	0.24	0.24	0.07	0.17	0.18	0.35	0.48	0.37
Other	0.04	0.03	0.06	0.06	0.03	0.05	0.08	0.05	0.10	0.05
EDUCATION	n=2888	n=4310	n=3451	n=6384	n=2836	n=2582	n=2635	n=2957	n=3162	n=2481
No degree	0.33	0.22	0.39	0.32	0.25	0.27	0.34	0.28	0.24	0.31
High School	0.45	0.49	0.38	0.43	0.50	0.46	0.41	0.46	0.46	0.44
Some College	0.18	0.22	0.19	0.21	0.21	0.23	0.21	0.21	0.24	0.21
College	0.04	0.06	0.04	0.04	0.04	0.03	0.05	0.05	0.07	0.04

	Denver	LasVegas	NewYork	Phoenix	Portland	Sacramento	SaltLakeCity	SanDiego	SanJose	Tucson
EMPLOYED	n=2886	n=4304	n=3464	n=6379	n=2838	n=2579	n=2633	n=2954	n=3168	n=2483
Full time	0.46	0.53	0.34	0.53	0.33	0.42	0.55	0.50	0.50	0.51
Part time	0.14	0.09	0.12	0.11	0.10	0.12	0.12	0.12	0.12	0.12
Not working	0.40	0.38	0.54	0.36	0.57	0.46	0.33	0.38	0.38	0.37
EVENTS[1, 3] - Crack Cocaine	n=630	n=699	n=770	n=1166	n=556	n=440	n=347	n=313	n=293	n=602
D	0.24	0.00	0.47	0.44	0.00	0.13	0.12	0.15	0.14	0.16
	(0.47)	(0.00)	(0.39)	(0.54)	(0.00)	(0.31)	(0.51)	(0.43)	(0.39)	(0.30)
T	0.09	0.00	0.14	0.13	0.00	0.03	0.01	0.05	0.07	0.04
	(0.14)	(0.00)	(0.10)	(0.16)	(0.00)	(0.07)	(0.05)	(0.13)	(0.14)	(0.08)
EVENTS[1, 3] - Powder Cocaine	n=536	n=581	n=620	n=1015	n=461	n=213	n=477	n=312	n=376	n=777
D	0.16	0.00	0.38	0.22	0.00	0.07	0.07	0.08	0.05	0.12
	(0.39)	(0.00)	(0.39)	(0.43)	(0.00)	(0.22)	(0.36)	(0.32)	(0.30)	(0.27)
T	0.06	0.00	0.12	0.07	0.00	0.01	0.01	0.03	0.04	0.03
	(0.12)	(0.00)	(0.11)	(0.13)	(0.00)	(0.05)	(0.04)	(0.09)	(0.12)	(0.07)
EVENTS[1, 3] - Methamphetamine	n=212	n=1137	n=29	n=1916	n=827	n=891	n=740	n=1067	n=1106	n=376
D	0.24	0.09	0.20	0.43	0.38	0.42	0.24	0.57	0.63	0.00
	(0.46)	(0.26)	(0.48)	(0.55)	(0.56)	(0.74)	(0.64)	(1.27)	(0.96)	(0.00)
T	0.06	0.02	0.06	0.10	0.09	0.09	0.04	0.15	0.17	0.00
	(0.11)	(0.07)	(0.12)	(0.12)	(0.14)	(0.17)	(0.09)	(0.34)	(0.25)	(0.00)
EVENTS[1, 3] - Marijuana	n=1472	n=2063	n=1795	n=3134	n=1510	n=1543	n=1180	n=1491	n=1438	n=1367
D	0.13	0.00	0.41	0.07	0.00	0.09	0.07	0.07	0.00	0.00
	(0.28)	(0.00)	(0.39)	(0.23)	(0.00)	(0.26)	(0.33)	(0.38)	(0.00)	(0.00)
T	0.04	0.00	0.13	0.02	0.00	0.02	0.01	0.03	0.00	0.00
	(0.08)	(0.00)	(0.11)	(0.06)	(0.00)	(0.06)	(0.04)	(0.11)	(0.00)	(0.00)
EVENTS[1, 3] - Heroin	n=164	n=206	n=591	n=417	n=391	n=182	n=220	n=230	n=116	n=192
D	0.12	0.12	0.40	0.19	0.17	0.00	0.04	0.19	0.28	0.00
	(0.30)	(0.28)	(0.39)	(0.44)	(0.32)	(0.00)	(0.19)	(0.46)	(0.38)	(0.00)
T	0.03	0.03	0.11	0.07	0.05	0.00	0.00	0.07	0.08	0.00
	(0.07)	(0.07)	(0.10)	(0.13)	(0.08)	(0.00)	(0.01)	(0.13)	(0.11)	(0.00)
USE30DAY[1, 2] - Crack Cocaine	n=613	n=666	n=716	n=1126	n=525	n=428	n=339	n=305	n=273	n=539
	8.53	10.39	15.99	11.10	8.17	8.67	6.39	7.93	7.24	10.04
	(10.17)	(11.36)	(11.57)	(11.82)	(10.83)	(10.41)	(9.92)	(10.16)	(9.91)	(11.16)
USE30DAY[1, 2] - Powder Cocaine	n=524	n=562	n=592	n=997	n=439	n=208	n=464	n=299	n=360	n=710

	Denver	LasVegas	NewYork	Phoenix	Portland	Sacramento	SaltLakeCity	SanDiego	SanJose	Tucson
	4.00	5.62	9.39	3.52	6.04	2.72	4.38	2.64	2.73	4.25
	(7.26)	(9.78)	(10.60)	(6.86)	(9.63)	(5.71)	(7.79)	(5.89)	(5.46)	(6.94)
USE30DAY[1, 2] - Methamphetamine	n=208	n=1099	n=25	n=1879	n=797	n=867	n=730	n=1033	n=1053	n=339
	5.91	9.06	6.16	11.51	8.30	10.42	9.75	10.67	9.62	8.27
	(9.21)	(10.38)	(11.33)	(11.42)	(10.25)	(10.65)	(10.96)	(11.14)	(10.32)	(10.77)
USE30DAY[1, 2] - Marijuana	n=1448	n=1998	n=1710	n=3078	n=1451	n=1502	n=1156	n=1449	n=1378	n=1259
	10.62	9.83	14.56	10.72	7.99	11.57	9.59	11.01	10.32	12.31
	(11.08)	(11.08)	(12.04)	(11.47)	(10.14)	(11.65)	(11.12)	(11.37)	(11.00)	(11.91)
USE30DAY[1, 2] - Heroin	n=162	n=197	n=561	n=403	n=362	n=175	n=213	n=220	n=101	n=160
	14.09	12.86	18.16	15.02	13.80	13.50	11.38	11.89	11.88	13.62
	(13.55)	(13.31)	(12.21)	(13.47)	(12.99)	(13.34)	(12.71)	(13.26)	(13.33)	(13.70)
EXPENDITURES[1, 2] - Crack Cocaine	n=443	n=521	n=647	n=886	n=422	n=344	n=254	n=246	n=227	n=452
	751.76	694.23	874.29	618.63	439.81	459.75	504.88	484.62	334.47	563.52
	(1661.18)	(1254.33)	(1229.23)	(1137.39)	(885.85)	(870.33)	(1368.30)	(936.38)	(672.21)	(1092.15)
EXPENDITURES[1, 2] - Powder Cocaine	n=369	n=408	n=515	n=713	n=355	n=154	n=366	n=206	n=265	n=518
	290.93	238.67	413.58	134.41	270.47	118.01	269.79	151.62	169.51	219.73
	(735.85)	(568.76)	(724.94)	(382.24)	(596.28)	(396.63)	(703.83)	(523.62)	(494.35)	(496.12)
EXPENDITURES[1, 2] - Methamphetamine	n=141	n=735	n=26	n=1243	n=578	n=595	n=464	n=693	n=742	n=246
	399.51	566.50	113.08	673.00	490.41	533.72	654.70	473.37	515.13	320.85
	(1058.72)	(1272.30)	(359.90)	(1284.82)	(1158.27)	(946.01)	(1380.95)	(898.08)	(1083.49)	(796.20)
EXPENDITURES[1, 2] - Marijuana	n=826	n=1189	n=1443	n=1734	n=990	n=952	n=685	n=812	n=823	n=730
	125.33	135.43	239.57	105.60	101.39	200.02	119.50	121.22	146.47	102.62
	(190.92)	(227.42)	(339.03)	(176.49)	(177.52)	(324.64)	(211.68)	(183.32)	(230.69)	(188.80)
EXPENDITURES[1, 2] - Heroin	n=135	n=163	n=504	n=333	n=319	n=146	n=184	n=183	n=96	n=155
	520.21	631.23	721.19	527.05	598.00	557.42	447.31	623.32	425.99	452.07
	(764.74)	(1007.11)	(857.77)	(818.15)	(854.15)	(824.10)	(716.51)	(1071.11)	(717.18)	(747.64)

1 - Mean and (standard deviation) reported for this variable

2 - Reported for only those who had used the drug in past 12 months

3 - *TIME** = 1

Table 3 – Probability Values based on Testing the Null Hypothesis that The δ Parameters Equal Zero across Four Market Questions

	Probability Values				
	Crack	Powder	Heroin	Meth	Marijuana
Denver	0.651	0.092	0.466	0.000	0.404
LasVegas				0.123	
NewYork	0.837	0.267	0.005		0.051
Phoenix	0.006	0.198	0.000	0.355	0.012
Portland	0.603	0.586	0.299	0.389	
Sacramento	0.015	0.091		0.004	0.197
SaltLakeCity	0.431	0.010	0.001	0.084	0.748
SanDiego	0.001	0.796	0.084	0.624	0.909
SanJose	0.074	0.066	0.001	0.956	
Tucson	0.866	0.339			
Significant Events	18				
Chance	3.9				
Denver	0.866	0.477	0.520	0.503	0.848
LasVegas			0.529	0.622	
NewYork	0.042	0.001	0.020		0.045
Phoenix	0.009	0.062	0.527	0.048	0.017
Portland	0.642	0.801	0.056	0.111	
Sacramento	0.064	0.056		0.000	0.195
SaltLakeCity	0.429	0.008	0.001	0.247	0.717
SanDiego	0.000	0.069	0.171	0.550	0.667
SanJose	0.179	0.193	0.017	0.448	
Tucson	0.472	0.156			
Significant Events	17				
Chance	4.0				
Denver	0.669	0.036	0.094	0.232	0.681
LasVegas			0.319	0.442	
NewYork	0.007	0.010	0.005		0.958
Phoenix	0.035	0.067	0.323	0.450	0.027
Portland	0.803	0.978	0.049	0.087	
Sacramento	0.053	0.329		0.000	0.151
SaltLakeCity	0.437	0.008	0.001	0.030	0.707
SanDiego	0.006	0.280	0.140	0.542	0.799
SanJose	0.181	0.000	0.085	0.328	
Tucson	0.199	0.112			
Significant Events	18				
Chance	4.0				

Table 4 – The Change in the Probability that Enforcement Caused a Shift in the Market Indicators

	Crack	Powder	Heroin	Methamphetamine	Marijuana
Source (positive implies toward a new source)					
Denver	0.00	-0.02	0.03	-0.07	0.03
LasVegas			-0.03	0.01	
NewYork	0.02	0.02	-0.07		-0.02
Phoenix	-0.01	-0.02	0.01	-0.01	0.04
Portland	0.02	-0.03	0.06	0.00	
Sacramento	0.02	0.07		-0.02	0.03
SaltLakeCity	-0.19	-0.27	0.31	-0.01	-0.07
SanDiego	0.11	-0.04	0.04	0.00	
SanJose	0.05	0.05			
Tucson	-0.11	-0.06	0.00	0.00	0.00
Proportion Positive	0.67	0.33	0.75	0.50	0.67
Contact (positive implies toward a public setting)					
Denver	0.03	0.02	0.15	-0.05	0.02
LasVegas			0.02	-0.04	
NewYork	-0.08	-0.05	-0.07		0.12
Phoenix	-0.05	-0.10	-0.16	0.02	0.04
Portland	0.07	-0.03	0.05	0.01	
Sacramento	0.06	0.03		0.04	0.07
SaltLakeCity	-0.33	-0.40	-0.18	0.03	-0.04
SanDiego	0.04	0.01	0.04	-0.01	
SanJose	-0.03	0.13			
Tucson	-0.05	-0.06	0.00	0.00	0.00
Proportion Positive	0.44	0.44	0.63	0.63	0.67
Location (positive implies toward a public setting)					
Denver	0.03	-0.04	0.12	0.05	0.00
LasVegas			-0.05	-0.06	
NewYork	-0.10	-0.02	0.03		0.10
Phoenix	-0.02	-0.08	-0.05	0.02	0.12
Portland	0.03	0.06	0.05	0.06	
Sacramento	0.08	-0.07		0.07	0.04
SaltLakeCity	-0.38	-0.37	1.89	0.01	0.04
SanDiego	-0.04	-0.01	-0.10	-0.01	
SanJose	-0.01	0.04			
Tucson	-0.01	-0.01	0.00	0.00	0.00
Proportion Positive	0.33	0.22	0.50	0.75	0.83
Neighborhood (positive implies out of the neighborhood)					
Denver	0.02	-0.01	0.11	0.02	-0.01
LasVegas			0.06	0.01	
NewYork	0.07	0.14	0.02		0.02
Phoenix	-0.04	0.04	-0.10	0.05	0.06
Portland	-0.05	0.03	0.05	-0.02	
Sacramento	0.00	-0.14		-0.02	0.07
SaltLakeCity	0.18	-0.24	1.47	-0.03	-0.13
SanDiego	-0.01	-0.03	-0.06	-0.01	
SanJose	0.02	-0.08			
Tucson	0.02	-0.03	0.00	0.00	0.00
Proportion Positive	0.67	0.33	0.63	0.50	0.50

Table 5 – Parameter Estimates for the EXPERIENCE Variable when SOURCE is the Dependent Variable

	Crack		Powder		Heroin		Methamphetamine		Marijuana	
	parameter	P-value	parameter	P-value	parameter	P-value	parameter	P-value	parameter	P-value
Denver	-0.03	0.00	-0.08	0.00	-0.02	0.35	-0.19	0.00	-0.13	0.00
LasVegas	-0.03	0.00	-0.08	0.00	-0.07	0.00	-0.03	0.04	-0.09	0.00
NewYork	-0.02	0.02	0.00	0.85	-0.01	0.48			-0.02	0.26
Phoenix	-0.05	0.00	-0.06	0.00	-0.04	0.00	-0.03	0.01	-0.06	0.00
Portland	-0.02	0.03	-0.04	0.04	-0.05	0.00	-0.06	0.00	-0.11	0.00
Sacramento	-0.05	0.00	-0.01	0.80	-0.02	0.15	-0.07	0.00	-0.13	0.00
SaltLakeCity	-0.02	0.43	-0.04	0.04	-0.09	0.00	-0.06	0.01	-0.07	0.02
SanDiego	-0.06	0.00	-0.11	0.01	-0.07	0.00	-0.06	0.00	-0.05	0.04
SanJose	-0.04	0.01	0.01	0.80	-0.06	0.01	-0.04	0.02	-0.04	0.11
Tucson	-0.07	0.00	-0.08	0.00	-0.03	0.16	-0.10	0.00	-0.05	0.07

Table 6 – Parameter Estimates for the AGE Variable when SOURCE is the Dependent Variable

	Crack		Powder		Heroin		Methamphetamine		Marijuana	
	parameter	P-value	parameter	P-value	parameter	P-value	parameter	P-value	parameter	P-value
Denver	0.01	0.16	-0.01	0.34	0.00	0.97	0.03	0.10	-0.01	0.14
LasVegas	0.00	0.86	-0.02	0.09	-0.02	0.11	-0.01	0.12	-0.01	0.06
NewYork	0.01	0.17	-0.01	0.36	0.01	0.25			0.00	0.84
Phoenix	0.01	0.12	0.00	0.84	0.01	0.48	0.00	0.40	0.00	0.48
Portland	0.00	0.71	-0.01	0.48	0.00	0.97	0.01	0.28	-0.01	0.45
Sacramento	0.00	0.88	0.01	0.59	-0.01	0.36	0.00	0.70	-0.01	0.00
SaltLakeCity	0.00	0.87	0.00	0.78	-0.03	0.12	0.00	0.68	-0.01	0.15
SanDiego	0.00	0.71	-0.03	0.16	0.01	0.49	0.01	0.30	0.00	0.82
SanJose	0.03	0.01	-0.04	0.02	0.00	0.98	0.00	0.36	0.00	0.85
Tucson	0.02	0.04	-0.02	0.06	0.02	0.26	-0.01	0.39	0.00	0.57

Table 7 – Parameter Estimates for the EDUCATION (No Degree) Variable when SOURCE is the Dependent Variable

	Crack		Powder		Heroin		Methamphetamine		Marijuana	
	parameter	P-value	parameter	P-value	parameter	P-value	parameter	P-value	parameter	P-value
Denver	-0.21	0.23	0.49	0.03	0.30	0.31	0.73	0.32	-0.08	0.52
LasVegas	-0.02	0.88	-0.19	0.41	-0.07	0.86	-0.07	0.61	0.00	0.98
NewYork	0.01	0.96	0.00	0.99	0.00	1.00			-0.01	0.91
Phoenix	-0.11	0.39	0.13	0.49	0.29	0.21	0.03	0.77	0.00	0.97
Portland	0.02	0.90	0.10	0.67	0.17	0.48	-0.05	0.78	0.09	0.54
Sacramento	-0.16	0.48	0.21	0.69	0.62	0.06	0.01	0.96	0.00	0.99
SaltLakeCity	-0.05	0.86	-0.10	0.71	0.69	0.09	0.05	0.76	-0.17	0.26
SanDiego	0.20	0.49	0.41	0.33	-0.67	0.06	0.24	0.08	-0.05	0.72
SanJose	0.34	0.19	0.02	0.96	0.92	0.11	0.12	0.44	0.27	0.03
Tucson	0.32	0.12	0.21	0.27	0.04	0.94	0.32	0.33	0.00	0.97

Table 8 – Parameter Estimates for the RACE (Black) Variable when SOURCE is the Dependent Variable

	Crack		Powder		Heroin		Methamphetamine		Marijuana	
	parameter	P-value	parameter	P-value	parameter	P-value	parameter	P-value	parameter	P-value
Denver	-0.23	0.15	-0.03	0.91	0.22	0.64	8.69	0.00	-0.14	0.28
LasVegas	0.27	0.04	0.10	0.67	0.12	0.77	0.37	0.08	0.08	0.43
NewYork	-0.27	0.10	-0.01	0.95	-0.14	0.48			-0.11	0.45
Phoenix	0.10	0.42	0.47	0.18	-0.27	0.53	0.35	0.15	0.09	0.40
Portland	0.18	0.26	-0.27	0.24	0.10	0.75	0.44	0.36	0.41	0.00
Sacramento	0.15	0.49	-0.43	0.37	0.28	0.33	0.17	0.38	0.13	0.22
SaltLakeCity	0.73	0.01	0.23	0.52	0.12	0.87	-0.14	0.74	0.22	0.43
SanDiego	0.55	0.08	0.88	0.17	0.71	0.09	0.01	0.96	0.11	0.41
SanJose	-0.02	0.96	0.21	0.65	-1.25	0.30	-0.05	0.84	0.00	0.99
Tucson	-0.22	0.28	-0.04	0.92	-0.08	0.89			-0.24	0.22

Table 9 – Parameter Estimates for the EMPLOYMENT (Not Working) Variable when SOURCE is the Dependent Variable

	Crack		Powder		Heroin		Methamphetamine		Marijuana	
	parameter	P-value	parameter	P-value	parameter	P-value	parameter	P-value	parameter	P-value
Denver	-0.16	0.32	-0.04	0.87	-0.24	0.47	0.69	0.04	0.27	0.02
LasVegas	-0.34	0.01	0.23	0.27	-0.59	0.13	-0.13	0.29	0.18	0.05
NewYork	0.02	0.88	-0.34	0.05	-0.14	0.38			0.10	0.26
Phoenix	-0.05	0.70	-0.30	0.09	-0.09	0.71	0.12	0.19	-0.01	0.92
Portland	-0.13	0.53	0.27	0.27	0.42	0.11	-0.09	0.58	-0.22	0.09
Sacramento	0.32	0.08	0.69	0.10	0.25	0.45	0.15	0.28	0.24	0.02
SaltLakeCity	-0.37	0.23	-0.03	0.91	-0.17	0.61	0.10	0.51	0.08	0.58
SanDiego	0.14	0.56	0.30	0.45	-0.22	0.52	0.02	0.90	0.06	0.60
SanJose	0.48	0.05	0.13	0.68	0.02	0.97	-0.06	0.63	0.14	0.21
Tucson	-0.04	0.83	-0.14	0.45	0.06	0.88	0.06	0.82	0.23	0.08

Table A1 – Log-Odds Ratio of Probability Regular Source/Probability New Source by Method of Contact, Location of Purchase, and Neighborhood by County of Arrest

	Method of Contact				Location of Apartment			Neighborhood	
	Telephone	House	Social Setting	Public Setting	House/ Apartment	Public/ Abandoned	Street/ Outdoors	Within	Outside
Crack Cocaine									
Denver	3.04	2.88	0.80	-1.53	1.61	0.01	-0.60	0.73	-0.36
LasVegas	2.53	1.16	1.01	-1.06	0.93	0.46	-0.51	0.82	-0.38
NewYork	0.25	0.33	-	-0.08	0.37	-0.26	-0.03	1.54	-0.86
Phoenix	2.66	2.05	0.30	-1.90	1.31	1.07	-1.02	1.01	-0.50
Portland	2.83	1.65	1.59	-1.31	1.01	2.29	-0.47	0.74	-0.32
Sacramento	2.50	1.86	0.50	-1.21	2.34	1.58	-1.08	0.94	-0.44
SaltLakeCity	2.37	3.18	1.32	-2.74	0.92	1.17	-0.75	0.60	-0.24
SanDiego	2.13	0.73	-0.33	-1.09	0.68	0.16	-0.32	0.49	-0.21
SanJose	1.48	1.04	0.64	-0.81	0.93	0.47	-0.46	0.73	-0.21
Tucson	1.82	1.86	2.08	-1.89	0.48	-0.31	-0.33	0.44	-0.18
Powder Cocaine									
Denver	2.05	0.67	-0.48	-1.12	0.85	-0.38	-0.36	0.38	-0.17
LasVegas	1.90	0.95	0.36	-1.89	-0.49	-1.32	-	0.47	-0.21
NewYork	0.19	0.15	-	-0.06	0.99	-1.43	0.11	1.15	-0.63
Phoenix	2.65	1.61	0.32	-2.29	0.19	-0.07	-0.16	0.63	-0.31
Portland	2.74	2.22	0.25	-1.40	0.60	0.81	-0.29	0.89	-0.35
Sacramento	0.32	-0.69	-1.39	0.07	0.81	1.39	-0.75	1.79	-0.44
SaltLakeCity	2.22	2.55	0.54	-2.12	1.49	0.11	-0.65	1.87	-0.48
SanDiego	2.91	1.57	2.77	-3.17	0.27	0.29	-0.27	1.27	-0.37
SanJose	0.84	-0.64	-0.51	-0.42	-0.45	1.39	0.02	-0.93	0.42
Tucson	2.68	2.25	1.13	-2.64	1.20	0.77	-0.97	0.01	-0.01
Methamphetamine									
Denver	1.27	0.98	1.67	-1.41	0.64	-1.66	-0.34	0.12	-0.07
LasVegas	1.43	1.40	0.10	-1.95	0.49	-0.07	-0.62	0.26	-0.10
NewYork	-	-	-	-	-	-	-	-	-
Phoenix	1.76	1.58	0.90	-2.41	1.32	0.84	-1.32	0.47	-0.20
Portland	2.34	2.18	1.69	-2.27	1.20	0.22	-0.98	0.73	-0.32
Sacramento	1.72	1.68	1.14	-1.91	1.03	0.48	-0.93	0.65	-0.28
SaltLakeCity	2.44	2.37	1.11	-3.11	0.96	1.40	-1.09	0.20	-0.05
SanDiego	1.91	1.99	1.20	-2.09	1.41	0.45	-1.17	-0.09	0.04
SanJose	1.59	0.87	0.43	-1.62	0.81	-0.25	-0.64	0.48	-0.16
Tucson	2.10	2.27	-0.29	-3.03	0.27	-0.69	-0.25	-0.38	0.21
Marijuana									
Denver	1.51	1.54	-0.21	-1.02	1.23	0.58	-0.69	0.87	-0.37
LasVegas	2.66	2.19	0.79	-2.10	1.28	0.56	-0.96	0.62	-0.20
NewYork	0.12	0.12	-0.85	0.01	0.17	0.25	-0.05	1.13	-0.70
Phoenix	2.76	1.97	0.70	-2.39	1.18	0.35	-1.04	0.39	-0.17
Portland	2.16	1.35	0.56	-1.39	1.77	0.77	-1.13	0.53	-0.25
Sacramento	2.16	1.89	0.78	-1.61	1.52	0.46	-1.01	0.62	-0.28
SaltLakeCity	2.32	1.34	0.31	-2.04	1.13	0.01	-0.94	0.57	-0.17
SanDiego	1.95	0.95	0.56	-1.62	1.14	0.53	-0.80	0.34	-0.17
SanJose	2.20	1.83	1.37	-1.87	1.13	-0.02	-0.74	0.63	-0.21
Tucson	1.89	1.61	0.05	-1.87	1.33	0.64	-1.10	0.51	-0.19
Heroin									
Denver	0.97	-	-	-0.48	0.55	-1.75	0.11	1.36	-0.58
LasVegas	1.93	0.76	-	-	-0.47	-0.86	0.60	0.02	-0.01
NewYork	0.07	1.04	-1.70	-0.05	0.39	-	-0.15	1.29	-0.68
Phoenix	1.12	0.72	-0.15	-1.60	0.47	0.49	-0.38	0.50	-0.28
Portland	2.42	1.34	0.14	-1.13	1.33	-	-0.33	0.42	-0.20
Sacramento	0.67	-0.14	-2.16	-0.30	0.15	-0.76	0.08	0.33	-0.20
SaltLakeCity	1.58	-	0.29	-1.93	1.37	-0.39	-0.37	1.56	-0.41
SanDiego	1.62	-0.58	-0.29	-1.43	-0.56	0.73	0.22	-0.06	0.03
SanJose	0.26	-	-	-0.32	-	-	-	-2.17	1.34
Tucson	2.87	-	-0.51	-2.31	0.87	-0.35	-0.20	0.89	-0.34

Table A2 – Probability of Purchasing from a Regular Source by Method of Contact, Location of Purchase, and Neighborhood by County of Arrest

	Method of Contact				Location of Apartment			Neighborhood	
	Telephone	House	Social Setting	Public Setting	House/ Apartment	Public/ Abandoned	Street/ Outdoors	Within	Outside
Crack Cocaine									
Denver	62.22	60.00	31.82	18.31	58.82	29.27	32.02	46.37	35.98
LasVegas	70.41	53.85	39.13	31.11	58.01	56.76	36.14	58.03	38.94
NewYork	63.46	76.60	75.00	52.86	79.66	54.05	53.26	66.15	37.76
Phoenix	79.73	70.85	38.46	30.41	68.95	71.43	39.67	68.87	52.26
Portland	70.34	56.67	36.36	27.43	59.77	62.96	39.24	55.56	43.92
Sacramento	67.27	45.33	41.67	23.36	56.76	47.83	24.56	48.36	33.07
SaltLakeCity	66.15	88.89	45.45	20.00	65.63	81.82	51.85	74.42	54.69
SanDiego	72.92	37.14	16.67	22.54	53.57	35.29	32.94	40.79	38.82
SanJose	56.00	40.00	40.00	27.69	54.35	33.33	33.33	50.00	35.92
Tucson	64.84	60.67	50.00	20.90	57.39	48.78	46.59	56.30	50.00
Powder Cocaine									
Denver	66.67	64.71	30.77	33.33	64.47	40.00	42.17	60.71	43.10
LasVegas	75.71	61.29	43.75	40.74	64.52	54.55	78.08	73.00	60.87
NewYork	76.92	73.47	25.00	65.12	78.21	59.38	65.59	73.46	56.41
Phoenix	76.88	67.59	43.48	42.11	66.20	70.73	69.44	73.99	59.88
Portland	79.25	76.92	43.75	32.89	70.69	67.86	52.00	66.67	54.31
Sacramento	68.75	57.14	25.00	53.33	66.67	72.73	42.11	75.00	54.05
SaltLakeCity	68.18	71.43	38.10	22.58	66.67	55.56	48.65	82.76	46.46
SanDiego	65.31	50.00	66.67	12.50	60.00	53.33	52.17	70.37	51.02
SanJose	68.89	43.75	46.15	37.04	51.11	66.67	48.48	54.29	53.73
Tucson	71.97	67.90	50.00	30.00	72.29	55.17	54.55	69.67	60.57
Methamphetamine									
Denver	50.00	50.00	57.14	21.43	57.14	10.00	38.89	56.25	32.26
LasVegas	65.19	58.56	34.78	34.78	60.53	51.28	51.56	66.30	52.70
NewYork	-	-	-	-	-	100.00	83.33	100.00	83.33
Phoenix	65.93	67.29	50.00	30.86	64.57	59.14	42.98	63.64	59.12
Portland	57.29	57.35	45.24	19.64	58.48	40.91	32.61	56.00	45.21
Sacramento	65.00	58.06	34.15	26.76	58.33	51.28	40.23	56.14	53.22
SaltLakeCity	58.03	53.33	30.77	15.00	54.95	60.00	28.89	56.41	50.00
SanDiego	62.45	62.83	48.94	24.66	62.97	49.28	35.96	57.32	52.57
SanJose	60.47	47.69	42.59	32.05	60.93	39.39	41.54	58.33	49.85
Tucson	67.21	72.50	33.33	40.00	67.05	66.67	45.45	65.00	65.52
Marijuana									
Denver	50.28	60.00	22.39	27.60	51.36	41.82	29.96	48.79	34.54
LasVegas	64.29	50.79	30.59	20.37	53.97	44.68	36.68	51.21	46.49
NewYork	65.44	70.18	51.52	59.03	69.59	73.17	58.33	68.72	45.28
Phoenix	63.38	60.00	36.84	25.31	58.18	50.93	37.78	54.83	51.84
Portland	54.97	48.53	28.41	26.32	53.13	39.62	23.84	45.73	36.63
Sacramento	64.88	52.53	33.33	21.67	56.07	35.14	28.76	47.81	42.00
SaltLakeCity	61.95	45.71	34.69	31.37	53.18	39.47	40.79	58.12	45.76
SanDiego	57.75	42.11	35.48	21.60	47.19	43.24	28.14	44.53	36.68
SanJose	58.59	53.49	50.62	22.31	56.40	40.48	38.01	51.92	46.09
Tucson	59.39	57.24	25.00	24.14	55.83	48.94	27.05	52.78	44.57
Heroin	**Telephone**	**House**	**Public Setting**	**Social Setting**	**House/ Apartment**	**Street/ Outdoors**	**Public/ Abandoned**	**Within**	**Outside**
Denver	70.73	80.00	50.00	0.00	58.82	22.22	64.79	72.92	48.00
LasVegas	83.33	45.45	70.00	-	75.86	71.43	84.13	83.56	71.43
NewYork	77.63	79.49	63.54	50.00	82.09	78.79	62.92	72.09	56.91
Phoenix	84.31	75.00	53.85	50.00	77.59	81.25	76.19	82.43	71.15
Portland	84.35	73.33	40.21	45.45	85.19	64.29	57.74	68.38	60.00
Sacramento	69.39	57.69	54.17	25.00	63.64	53.85	58.82	70.69	47.83
SaltLakeCity	78.43	66.67	33.33	50.00	76.09	63.16	72.73	84.44	66.67
SanDiego	80.60	50.00	53.33	40.00	69.23	77.78	69.23	74.47	68.52
SanJose	70.27	75.00	40.00	0.00	66.67	61.54	61.11	54.55	67.74
Tucson	88.06	100.00	55.56	16.67	84.38	76.19	85.00	86.67	76.92

Table A3 – Search Terms

Search Term	Number of Hits	Useful # of Articles (numbers represent approximates)	Content Found	Qualitative Impressions
NewsAnalyst Tested Search Terms				
Gangs & Drugs	579	23	Information on investigations, arrests, trials, and drug seizures relating to gang activity.	**Useful** search term. Produces a good number of articles that provide broad information on gang involvement in drug markets.
Gangs & Police	1018	25	Information on police activities relating to gang activity. Much of this information revolves around the drug trade.	**Useful but redundant**. Information related to gangs and drugs captured in Gangs & Drugs search term. Outside of that provides hits related to general gang activity, investigations and arrests (e.g., homicides, gang violence) that were outside of our area of interest.
Police & Drugs	3330	15+	Wide range of information involving the police and drugs.	**Not useful.** Many hits related to drug use and scandals among rank officers. Hits related to investigations, arrests and seizures relevant to our work can be found through other search terms (e.g., gangs & drugs, task force & drugs, sting & drugs).
Drugs & Police Programs & Denver	646	NA	Wide range of information concerning drug programming in the Denver area and beyond.	**Not useful.** Too great a range of responses, the majority of which have nothing to do with illicit drug markets.
Drugs & Community & Initiatives	171	6	Wide range of information on community initiatives related to drugs.	**Not useful.** Search term retrieves a broad range of information concerning drugs both the legal (e.g., pharmaceutical industry, disease treatment) and illicit.
Task Force & Drugs	502	50+	Drug seizures and arrests reporting	**Very good** search term. High level of agreement on the usefulness of this search term. Located many articles that would be of interest in learning more about police investigative and seizure activities.
Sting & Drugs	149	16	Drug arrests and seizures related to formal police sting operations.	**Very good**. Targeted results related to formal police operations.
Lexus Nexus Tested Search Terms				
Drug Enforcement & Gangs	119	9	Drug sweeps and arrests of gang members connected to a drug enterprise, as well as	This is a subset of hits produced by Gangs & Drugs, but is too refined for the nature of this study.

Search Term	Number of Hits	Useful # of Articles (numbers represent approximates)	Content Found	Qualitative Impressions
			reports on arrests and indictments of gang members connected to a drug enterprise	
Drug Enforcement & Police	658	14	Raids, busts, arrests, indictments, and seizures.	This provided more targeted results than Police & Drugs, avoiding much of the media on scandals related to officers and drugs. Use in lieu of Police & Drugs.
Task Force & Police	728	15	Reports on a wide range of topics involving the police and taskforces. Some relate to drugs and others not.	**Not useful.** Generates a broad range of hits that are not useful to this study.
Task Force & Gangs	83	6	Reports on gang members selling drugs, drug rings busted, arrests, indictments.	This is a **useful** search.
Police & Drugs & Profiling	50	3		Not useful.
Drugs & Raid	524	17	Meth lab busts, raids, law re: no-knock raids, drug busts, and indictments of persons involved in drug ring.	This is a **useful** search.

Table A4 – Articles Identified

Site	Newspaper	Number of articles that came up in searches*	Number of articles identified for full review	Number of events identified as relevant to the study	Number of events identified as directly related to the local drug market
Las Vegas	Las Vegas Review	433	42	9	3
Phoenix	The Arizona Republic	1063	62	25	17
Portland	The Oregonian	1262	56	26	6
Sacramento	Sacramento Bee**	1,393	107	42	14
Salt Lake	Salt Lake Tribune	737	43	14	4
San Diego	The San Diego Union - Tribune	2323	107	21	12
San Jose	San Jose Mercury News	1239	59	33	14
Tucson	Tucson Citizen	407	25	16	2
Denver	The Denver Post	1405	60	30	23

* Reflects duplicates, as the same article may appear in multiple searches

** Search for 1999-2002 was conducted using NewsLibrary

Table A5 – Observations

Sites	Newspapers	Observations
Las Vegas	Las Vegas Review	• A lot of reporting on gang-related violence, but not the results of law enforcement efforts. • As a HIDTA area, expected a greater number of events reported by the media.
Phoenix	The Arizona Republic	• Reporting on a lot of "national" enforcement operations that only minimally impacted Phoenix area • Reporting focused on activity at Mexican border and in Mexico, unrelated to local drug market • Reporting emphasized methamphetamine production, both inside and outside the county.
Portland	The Oregonian	• Reporting was found to be poor, pertinent facts were difficult to identify through review of article. • Reporting did not cover law enforcement tactics or operations, coverage limited to specific arrests and seizures. • Reporting heavily focused on regional task force outputs.
Sacramento	Sacramento Bee	• Reporting heavily focused on federal enforcement of marijuana growers and distributors (often those with approval through CA Proposition 215). • A number of letters to the editor from citizens • Covered national news on drug enforcement that was not relevant to the target area.
Salt Lake	Salt Lake Tribune	• Reporting focused on methamphetamine production and sales. • A lot of reporting on gang activity, though most of it not related to large drug busts.
San Diego	The San Diego Union – Tribune	• A lot of reporting on methamphetamine use, but not as much on methamphetamine production. • A lot of reporting on investigation of Mexican drug cartels. • Expected more reporting on seizures at the Mexican border and its relationship to local drug markets. • Expected more seizures in general, given the concentration of federal, state, and local law enforcement in the region.
San Jose	San Jose Mercury News	• Reporting heavily focused on federal enforcement of marijuana growers and distributors (often those with approval through CA Proposition 215). • Reporting of regional and local law enforcement focused on methamphetamine production. • Reporting covered stories throughout the entire San Francisco Bay area, including several stories in Oakland and the East Bay.

Sites	Newspapers	Observations
Denver	The Denver Post	• Reporting included greater emphasis on motorcycle gangs and links to drugs and violence than in other study sites. • A lot of reporting of enforcement activity outside Denver County.
Tucson	Tucson Citizen	• Reporting on a lot of "national" enforcement operations that only minimally impacted Tucson area. • Reporting focused on activity at Mexican border, unrelated to local drug market. • Expected more seizures in general, given the concentration of federal, state, and local law enforcement in the region. • With the amount of enforcement focused on local gang activities, expected more arrests and seizures involving organized gangs. Most of the reporting on gangs focused on violence although their involvement in the drug market is often mentioned. • Very low number of major methamphetamine seizures, although production in this part of the country is a big problem.

Table A6 – Interviews with Law Enforcement

Site	Successful Contact with Law Enforcement Executive	Successful Contact with officer recommended by department	Interview Completed
Denver	Yes	Yes	Yes
Las Vegas	Yes	No	No
Phoenix	Yes	No	No
Portland	Yes	Yes	Yes
Sacramento	Yes	No	No
Salt Lake	Yes	Yew	Yes
San Diego	No	No	No
San Jose	Yes	No	No
Tucson	Yes	Yes	Yes