

**Marijuana Law Enforcement in the United States:  
Estimates from an Economic Model of Crime\***

**October 2005**

**Edward M. Shepard  
Paul Blackley  
Economics Department  
Le Moyne College  
1419 Salt Springs Road  
Syracuse, New York 13214-1399  
Telephone: 315-445-4235  
e-mail: [Shepard@LeMoyne.edu](mailto:Shepard@LeMoyne.edu)**

\*The authors are grateful for comments on an earlier version of this paper presented at the Meetings of the Canadian Economic Association, McMaster University, Ontario, May 28, 2005. Clifford Donn of Le Moyne College and Jay Hamilton of CUNY John Jay School of Criminal Justice also provided helpful comments.

## **Abstract**

This paper presents estimates of an economic model of crime to evaluate the effects of marijuana enforcement on crime rates and on involvement with hard drugs in later periods. Marijuana is the most widely consumed illicit drug, resulting in an U.S. market estimated to exceed \$10 billion annually. Marijuana arrests have increased to over 2 million arrests during the past three years, with over 80 percent for possession as opposed to its sale or manufacture. Enforcement is estimated to take close to \$8 billion a year in criminal justice system resources.

There is disagreement over the magnitude of social costs associated with marijuana and other illicit drugs. Some reports suggest that social costs may be substantial because of adverse effects on crime, health and mortality, and economic productivity. There is also no consensus as to whether these social costs result from drug use per se, or from drug laws and associated enforcement activities. From a policy perspective, current enforcement is justified only if it provides net benefits greater than alternatives such as a legal, regulated market for marijuana.

In this paper, we draw upon prior work to model crime rates as a function of economic conditions, enforcement effectiveness, and arrests for possession or sale of marijuana. A national pooled sample of over 1300 counties in the United States for 1994-2001 is used to estimate the model. The models include cross-section and time-series fixed-effects and corrections for autocorrelation and heteroskedasticity. The results suggest that marijuana arrests are associated with increases in non-drug crime, including homicides, burglaries, motor vehicle thefts and larcenies. Marijuana arrests are also associated with increases in hard drug arrests in later periods. These results raise significant questions about the existing focus in the United States on criminal justice approaches to marijuana control.

## Introduction

Federal and state policies regarding illegal drugs are numerous and have multidimensional objectives. In recent decades, the United States has emphasized criminal justice approaches to enforcing drug prohibitions with substantial and increasing resources allocated to law enforcement and prisons. Federal and state resources have been targeted for enforcement and interdiction in order to disrupt or limit the flow of drugs into the country and across states, to deter individuals from using or selling drugs through risk of arrest and application of severe penalties such as fines, property seizures and imprisonment, and to arrest those who use, sell, or manufacture drugs. These policies have resulted in large and growing economic costs for the public sector, with substantial increases in resources used by federal, state and local drug control and police agencies, prosecution and imprisonment, drug education and treatment, and research pertaining to drug control.<sup>1</sup> At the federal level, spending for drug enforcement (including interdiction and intelligence) rose from about \$1.5 billion in 1981 to over \$12 billion by 2002. State level spending for drug control activities has been estimated to be even higher.<sup>2</sup> Arrests for drug law violations have shown a similar pattern, increasing from under 600,000 a year in 1980 to over 1.5 million today.<sup>3</sup> In part because of strict drug laws and increased penalties, the prison population has grown to over 2 million inmates.<sup>4</sup>

---

<sup>1</sup> According to a recent National Research Council Report (2001), federal expenditures on enforcement increased more than ten-fold between 1981 and 1999.

<sup>2</sup> Historical information on federal drug control expenditures are from an evaluation of government reports provided by Transactional Records Access Clearinghouse (TRAC, 1998) at Syracuse University, Syracuse, NY. Expenditures for recent years are provided in the National Drug Control Strategy Report of ONDCP, 2002. See Miron, 2003, pp. 12-15 for a discussion of methods for measuring state and local (and federal) expenditures for drug prohibition enforcement. Miron (2005) provides current information about federal drug control expenditures.

<sup>3</sup> Federal Bureau of Investigation (FBI), Uniform Crime Reports, for the years 1981 and 2002. See The Sentencing Project report Drug Policy and the Criminal Justice System (2001) for a discussion of these trends, available at <http://www.sentencingproject.org/pdfs/5047.pdf>.

<sup>4</sup> Bureau of Justice Statistics, Prison Statistics, Summary Findings as of Dec. 31, 2002, available at <http://www.ojp.usdoj.gov/bjs/prisons.htm#findings>. A discussion of these numbers is contained in a report of the report of the Sentencing Project (2002): U.S. Prison Populations—Trends and Implications, available at <http://www.sentencingproject.org/pdfs/1044.pdf>.

By any measure, the opportunity costs of enforcing marijuana laws in the United States are large. A recent study estimates the size of the marijuana market to exceed \$10 billion a year and estimates the annual cost of marijuana law enforcement to be about \$7.7 billion (Miron, 2005).<sup>5</sup> Drug Enforcement Agency (DEA) officials have reported that marijuana investigations remain a top priority for the federal enforcement agency. In 2003, there were over 750,000 arrests for marijuana, 88 percent of which were for possession only. Over 2 million marijuana arrests have been made during the past 3 years, and over 6 million have been made over the last 10 years (Getman ,2005). At the federal level, marijuana remains in the most prohibited category as a “Schedule 1” drug, which is reserved for highly addictive, dangerous drugs with no legitimate medical uses. Cocaine and many amphetamines, in contrast, are classified as “Schedule 2” drugs, legal under certain restrictive conditions, and tightly controlled. Unless this scheduling of marijuana changes, marijuana arrests and prosecutions are likely to remain a high priority for the federal government, influencing the allocation of public sector resources and relations with other nations at the borders and around the world. <sup>6</sup>

Marijuana laws are being increasingly questioned in the U.S. There is growing evidence for the medical utility of marijuana for specific conditions, and a lack of evidence for the significant harm or adverse health effects associated with alcohol, tobacco, other illicit substances, and even commonly prescribed prescription medications (Earleywine, 2005). In addition, substantial law enforcement resources have been directed towards enforcing marijuana

---

<sup>5</sup> In addition, tax revenues that are forgone because of marijuana prohibition are estimated to range from about \$2.8 to \$6.4 billion per year, depending on the form of taxation (Miron 2005).

<sup>6</sup> For some recent evidence that enforcing marijuana laws remains a high priority at the federal level, see [statement of Karen P. Tandy, Administrator, Drug Enforcement Administration, before the U.S. House of Representatives, March 24, 2004, available at: http://www.usdoj.gov/dea/pubs/cngrtest/ct032404.htm](http://www.usdoj.gov/dea/pubs/cngrtest/ct032404.htm).

laws without any solid evidence of effectiveness. A recent report by the National Research Council (2001, pp. 3-11) indicated that because of “a lack of investment in data and research,” the nation is in no better position to perform a comprehensive assessment than 20 years ago, and that “it is unconscionable for this country to continue to carry out a public policy of this magnitude and cost without knowing whether and to what extent it is having the desired effect.” An organized drug policy reform movement has also emerged to advocate reforms at all levels of government. Many states have begun to experiment with alternative approaches to drug issues that de-emphasize the role of policing, while reducing penalties for drug offenses. In addition, many states have adopted “harm reduction” reforms such as needle exchanges or sale of syringes, methadone maintenance, and medical marijuana in recent years.<sup>7</sup> Thus, while Federal officials push for intensified drug enforcement, individual states appear to be moving in the opposite direction. It is clear that further research into the effectiveness of alternative approaches to drug control is needed.

Given the difficulty in obtaining reliable data on illegal drug markets, a comprehensive cost-benefit analysis of alternative drug policies has not been done. However, it is possible to assess the enforcement consequences of the continuing emphasis on supply-side approaches to controlling marijuana use. In particular, this article derives estimates to answer two questions:

- Do increased marijuana arrests have a significant association with changes in the rates of other crimes such as homicides and a set of property-related offenses?
- Do increased marijuana arrests affect rates of arrest for involvement with harder drugs in current or later periods?

---

<sup>7</sup> Drug Policy Alliance (2003), *State of the States: Drug Policy Reforms, 1996-2002*, found many changes in state legislation on issues such as advancing alternatives to incarceration, protecting medical marijuana patients and providers, expanding sterile syringe availability, and restoring benefits and voting rights to former drug offenders.

The next section presents a theory of the economic impacts of anti-marijuana law enforcement and reviews prior relevant research. The work of Becker and Murphy (1988), Benson and Rasmussen (1991), Levitt (1998), and Miron (1999) establishes the basis to model non-drug crime rates as a function of economic conditions, law enforcement effectiveness, and arrests for the possession or sale of marijuana. Section 3 examines the data used to test a set of hypotheses derived from the economic model of marijuana markets. A national sample of over 1,300 U.S. counties for the 1994-2001 time period is used in the estimation. The results indicate that marijuana arrests are positively related to several non-drug crimes and future arrests for involvement in “hard drug” activity. A final section presents a summary and concluding remarks that call into question the current criminal justice approaches to marijuana control.

## **2. Theory and evidence from prior research**

Microeconomic theory holds that resources should be allocated to law enforcement up to the level where their marginal benefit is equal to their marginal cost, and when enforcement is cost effective compared with alternative approaches. It is therefore efficient for society to tolerate some positive level of crime, including some illicit drug use if the additional cost of achieving a “drug free” society exceeds the benefit.<sup>8</sup> The objective of current drug control policies is to reduce both supply and demand by achieving a higher risk of arrest and incarceration for buyers and sellers as well as disruptions in supply.<sup>9</sup> Benefits commonly cited for current policies are improvements in health, safety and the quality of life, higher productivity in the workplace, and

---

<sup>8</sup> The marginal cost of marijuana eradication is assumed to be an increasing function of enforcement effort since it can be produced and sold in “underground markets” in any part of the world. The cost increases occur as relatively more resources are needed at the borders and attempts are made to destroy nondomestic as well as domestic sources of production. Marginal benefits are assumed to decline since increased enforcement levels against existing suppliers lead to the development of alternative supplies and distribution.

<sup>9</sup> See Miron and Zwiebel (1995) and Rasmussen and Benson (1994) for examples of assessments of the economics of drug prohibition in the context of supply and demand models.

reductions in “drug related” crime. In the case of marijuana, special priority is often placed on adolescents and young adults, since it is viewed as a gateway to further drug use and the related problems of dependence and addiction, joblessness, and involvement in crime and the criminal justice system over a long period of time.

The decrease in non-drug crimes that is frequently cited as a benefit of supply-reduction policies is the central issue of this study. For example, a report by the United States Drug Enforcement Agency (DEA), *Speaking Out Against Drug Legalization*, states “most violent crime is committed not because people want to buy drugs, but because people are *on* drugs.”<sup>10</sup> Past research has documented positive correlations between illicit drugs and other crimes (ONDCP, 2000). Relative to the general population, a high percentage of persons arrested test positive for illicit drugs, while drugs have been found to be a contributing factor in the commission of many crimes (U.S. Department of Justice (2002)). However, significant positive correlations between illicit drugs and crime may not reflect causality. Some individuals may be predisposed to commit crimes and take illegal drugs. Individual characteristics associated with increased drug use and increased propensities to commit crimes might include low self-esteem, risk-taking behavior, and high rates of discounting future benefits, aggressive personalities, and unstable or impoverished households.<sup>11</sup> Associations between drugs and crime could be due to drug use, drug sales, or result from other characteristics of illegal drug markets, including methods of drug enforcement (Goldstein, 1985). While currently illegal drugs are likely to be

---

<sup>10</sup> The publication is available at <http://www.usdoj.gov/dea/demand/speakout/07so.htm>.

<sup>11</sup> Rasmussen and Benson (1994) review empirical evidence about drugs and criminality and conclude that the set of people who are drug offenders only partially overlaps with the set of Part I crime offenders. Thus, while the percentage of non-drug criminals who use drugs is larger than the general population, a substantial majority of drug offenders do not commit violent or property crimes. See Chapter 3, pp. 39-66.

more widely available at lower prices with most forms of legalization, many researchers have concluded that the violence characterizing urban drug markets would also be reduced.<sup>12</sup>

Becker's (1968) economic model of crime, based on the theory of the rational criminal, has provided a framework for over three decades of empirical research on crime. Crime rates are determined by economic and demographic conditions, the effectiveness of law enforcement activities, and the characteristics of local "crime markets". The "rational criminal" makes the decision to commit a crime when the expected benefits (e.g. the monetary value of stolen goods) exceed the economic costs (e.g. resources used to commit the crime, forgone earnings, and the risks of arrest, incarceration, financial penalties). Criminal justice activities affect crime rates because they in large part determine the availability of crime opportunities, the probability of arrest and conviction, and the severity of punishment. Published research has produced considerable empirical evidence consistent with the basic predictions of Becker-type rational choice models.<sup>13</sup>

In recent years, researchers have adapted this model to assess the role of drug enforcement in explaining underlying rates of crime, finding that drug prohibition and enforcement activities have been associated with the commission of crimes.<sup>14</sup> Drug prohibitions create opportunities for "drug crime" directly since the use or sale of illegal drugs is, by definition, a crime. There are numerous reasons why drug prohibitions may be associated with

---

<sup>12</sup> Miron (1998), Duke and Gross (1993), and Nadelmann (1988) and others have made this argument. Alcohol, for example, is known to be associated with crime because of pharmacological effects, and yet the production, distribution, and selling of alcohol have not been particularly violent since prohibition was lifted.

<sup>13</sup> For examples, see Corman and Mocan (2000), Levitt (1998), Polinsky and Shavell (1984), Witte (1980), and Stigler (1970). To illustrate, Levitt estimated an economic model of crime to investigate the relationship between enforcement effectiveness (for different types of crime) and reported crime rates. He found that increases in enforcement effectiveness (for one type of crime) decreased that crime due to both deterrent effects and incapacitation effects, but increased other types of crime that were considered substitutes such as robberies and burglaries. Corman and Mocan (2000) found "robust evidence of deterrent effects of arrests and police on most categories of serious felony offences"(p. 584).

<sup>14</sup> Recent examples include Benson et al (1998,2001), Miron (1999), Kuziemko and Levitt (2001), and Resignato (2000).



other crime as well.<sup>15</sup> In addition, when enforcement resources are directed at the supply side of illegal markets, prices of the traded commodities will increase. If the short-run demand for drugs is inelastic, then expenditures and revenues will also increase, making participation for sellers more profitable.

Shepard and Blackley (2005) provided a summary of previous work that outlines either the channels by which the sale or use of illicit drugs such as marijuana may lead to other crimes or the ways that drug law enforcement may lead to additional crime. The link between the sale or use of illicit drugs and other crimes may be realized by:

- 1) pharmacological effects, if drug use increases aggressive tendencies or reduces inhibitions, increasing the likelihood that users commit crimes;
- 2) dependency or addiction effects, if users participate in economic crimes such as burglary or larceny to obtain income to purchase drugs; and
- 3) systemic market effects that involve the manufacture, distribution, and sale of illegal drugs, with no legal mechanisms for dispute resolution. As a result, violence often occurs as a way to settle supply-side disputes (Miron, 1999).<sup>16</sup>

When successful, enforcement approaches will operate to reduce the supply and demand of drugs, resulting in less use and smaller markets. In addition, successful prosecution of market participants would prevent these individuals from committing other crimes associated with illegal drug activity (Kuziemko and Levitt, 2001).

However, enforcement of drug laws may increase crime because:

---

<sup>15</sup> Many researchers have explored the relationship between drugs, drug prohibition, and crime, including Wilson 1990, Nadlemann 1992, Kleiman 1993, Duke and Gross 1993, Rasmussen and Benson 1994, Miron and Zwiebel 1995, Miron 1998, and Kuziemko and Levitt 2001. The channels explored here, in which drug enforcement potentially increases (or decreases) crime, have been identified in prior research.

<sup>16</sup> Goldstein (1985) and Nadelmann (1988) both discuss the basic ways in which drugs and crime are associated, while Duke and Gross (1993) have identified numerous ways in which drug prohibition can lead to greater crime.

- 1) distribution networks are disrupted, leading to disputes over market share within the illegal drug markets and more violence;
- 2) sellers, who face a greater risk of arrest and disruption of supplies may switch to other forms of economic crime to obtain income (Kuziemko and Levitt, 2001);
- 3) individuals who use illegal drugs for medical purposes may resort to crime if withdrawal symptoms or other behavioral changes result from reduced use because of drug enforcement activities;
- 4) higher prices and profits may provide incentives for the expansion of market areas by current sellers or for entry by new competitors, causing violence among distributors and sellers and/or greater economic crime by users facing higher prices;<sup>17</sup>
- 5) resources used for drug enforcement cannot be used against other types of crime, reducing the enforcement effectiveness in those area (Rasmussen and Benson, 1994); and
- 6) the incarceration of drug users and sellers uses prison cells in a system at full capacity, leading to shorter sentences and less frequent imprisonment for other criminals, who may then resume illegal activities. If capacity is expanded, the opportunity cost may be fewer resources for other areas of the criminal justice system (Kuziemko and Levitt, 2001).

A series of recent studies has found that drug prohibitions and drug arrests are associated with increases, not decreases, in non-drug crime. Miron (1999, 2001) showed that enforcement of drug prohibitions has led to increased violence in the United States and the degree of enforcement of drug prohibitions across countries is positively associated with increased

---

<sup>17</sup> Silverman and Spruill (1977) found that higher heroin prices were associated with increased property crime. Some recent studies find higher cocaine prices are associated with less crime. (See Kuziemko and Levitt 2001, or Markowitz, 2000.)

violence. Others have also estimated positive associations between drug enforcement and homicides (Brumm and Cloninger 1995, Friedman 1991, Benson et al. 1992). In addition, Benson et al. (1992) found that increases in drug enforcement in Florida were associated with increases in property crime, while Kuziemko and Levitt (2001) reported that increases in drug prisoners have led to reductions in expected time served for other offences, increasing other crimes as a result. Shepard and Blackley (2005) estimated a set of economic crime models for New York State (1996-2000) to evaluate the effects of arrests for the possession and sale of marijuana and hard drugs on crime rates for robbery, burglary, assault, and larceny. For each non-drug crime, at least one type of drug arrest variable had a positive and significant impact. In no case were arrests for the sale or possession of illegal drugs found to significantly lower non-drug crime rates.

### **3. Empirical Analysis**

In order to provide insight into consequences of the U.S. government's renewed emphasis upon marijuana control, the impacts of arrests for the sale and possession of marijuana on other criminal activity are assessed. The analysis initially considers whether marijuana arrests are significantly related to rates of property crime involving burglary, larceny, and motor vehicle theft. It then provides estimates of the impact of arrests for the sale of marijuana on violent crime, murder, and the incidence of arrests for hard drug possession. Table 1 provides the units of measurement, sample means, and standard deviations of the variables used in the empirical

analysis. The sample selection methodology, data sources, and official definitions for each type of crime are contained in the Appendix. The estimated equations are of the general form:

$$Crime_{it} = \alpha + \beta_1 DrugArrests_{it} + \beta_2 DrugArrests_{i,t-1} + \beta_3 Enforcement_{it} + \beta_4 UnemploymentRate_{it} + \beta_5 AnnualWage_{it} + \mu_{it} \quad (1)$$

where Crime represents reported arrests per 1000 residents for the five criminal activities: burglary, larceny, motor vehicle theft, homicide, and hard drug possession. Drug Arrests are specified as either arrests for marijuana possession or sales. This equation is based on an economic model of crime specified by Levitt (1998) and is similar to those used in prior studies by Resignato (2000), Benson et al. (1998, 2001) and Shepard and Blackley (2005). The sample includes observations for 1337 counties (i) for the years 1994-2001 (t).

The summary in Table 1 indicates that the crimes of larceny and burglary have the highest reported rates of 19.11 and 6.79 per 1000 residents, respectively. While motor vehicle thefts average 1.86 per 1000, the relative infrequency of homicides is illustrated by an average of slightly more than 0.04 per 1000. The analysis uses three types of Part II drug abuse crimes or violations as classified by the U.S. Department of Justice (1984): Marijuana Sales, the manufacture and/or sale of marijuana, Marijuana Possession, the possession of marijuana, and Hard Drug Possession, the possession of non-marijuana drugs.<sup>18</sup> Arrest rates for possession are higher, averaging 2.43 per 1000 for marijuana and 1.13 per 1000 for harder drugs. The arrest

---

<sup>18</sup> A variety of measures such as drug arrests, changes in drug arrests, drug enforcement budgets, or incarcerations for drug crimes have been used to measure drug enforcement. Benson et al. (1998) argued that “drug arrests reflect the consequences of the allocation decisions” and are an appropriate variable for measuring the intensity of drug enforcement.

rate for selling marijuana sales is substantially lower at just 0.36 per 1000. A one period lag for drug-related arrests is included to allow arrests and subsequent prosecutions to have a delayed impact upon other types of crime.

Enforcement measures the ratio of Part I arrests to reported Part I crimes (Part I crimes are defined in the Appendix). With a mean of only 0.27, the typical county makes an arrest for about one-quarter of its reported crimes. As put forth by Levitt (1998), a negative relation between Enforcement and Crime suggests that increased law enforcement effort in the aggregate reduces criminal activity by reducing the supply of offenders and deterring those considering participation in illegal activity. When enforcement measures are applied across the criminal justice system, criminals substitute away from crimes with stronger enforcement efforts and towards those with a lowered perceived risk of arrest. A review by Levitt of studies using aggregate variables similar to Enforcement concluded that there is a negative relation between arrests and most rates of specific crimes.

Fixed-effects models are used to estimate the parameters of equation (1) for each of the five crime rates specified as dependent variables above. The Unemployment Rate and average Annual Wage are included to control for economic conditions in each regression.<sup>19</sup> Lags were not included for Enforcement, the Unemployment Rate, and the Annual Wage because their effects are more immediate and preliminary estimates indicated that their coefficients were not significant in any of the specifications. For the fixed-effects models, county dummy variables capture the variation in each crime rate due to county-specific factors that are invariant over time. Time effects are also included using yearly dummies that control for changes in national

---

<sup>19</sup> The unemployment rate is expected to be positively related to each crime rate (Raphael and Winter-Ebmer, 2001). Counties with a higher average annual wage are likely to have fewer low income residents and therefore are hypothesized to be associated with fewer economic crimes per capita. Negative relationships are also expected between the average annual wage and both homicides and hard drug possession.

factors affecting crime rates from 1995 to 2001. Failure to include significant cross-section and time-series effects would yield biased coefficient estimates.

Table 2 shows the coefficients estimated for the impact of arrests for marijuana possession upon the incidence of each of the three property crimes. On the basis of a significant estimate of a first-order autocorrelation coefficient, the estimates for each equation incorporate a correction for autocorrelation. In all cases throughout this section, the standard errors used to determine coefficient significance levels are based on White covariances robust to heteroscedasticity in the error term.

Increases in current period arrests for marijuana possession are associated with increases in reported rates of larceny and motor vehicle theft. These results support the view that arrests for possession may significantly harm the employment or educational status of those involved, leading to a greater likelihood of stealing to get by. Because of the illegality of participating in marijuana transactions, prices may be higher when sellers perceive a greater risk of being caught due to the information provided by detained buyers. This implies that users may also turn to stealing in order to finance their purchases of marijuana at higher prices.

Estimated effects of increases in marijuana arrests on other crime rates are calculated for a typical county in the sample. For example, a one-standard deviation increase in the rate of marijuana possession arrests per 1000 would be associated with 52 additional larcenies and 5 additional motor vehicles thefts in a county of 100,000 persons.<sup>20</sup> For more populous

---

<sup>20</sup> The effects are point estimates of the increase in the number of other crimes reported. They are calculated by multiplying the significant possession coefficients from the regression equations by the standard deviation of arrests for marijuana possession and a county population of 100,000, which is slightly above the sample average of 87,000. The estimated effects for marijuana sales arrests (and for the Enforcement, Unemployment Rate, and Average Wage variables) are also derived using this approach. In each case, appropriate adjustments are made to the reported parameter and variables values in order to convert the estimates to the change in reported crimes per county.

jurisdictions, the effect can be calculated by substituting the appropriate population for the 100,000 value.

The significant coefficients for the Enforcement and economic variables have the expected signs. Increases in arrests per reported crime and a county's average wage lead to fewer arrests for burglary, larceny, and motor vehicle theft. In each case, the largest absolute effect is upon larcenies and the smallest is upon motor vehicle thefts. A one-standard deviation increase in the average wage reduces larcenies by 105, burglaries by 49, and motor vehicle thefts by 28. Comparable values for Enforcement are 36, 15, and 6. Higher unemployment rates are associated with more burglaries, with a one-standard deviation increase in unemployment raising burglaries by 20 for a typical county.

Results for the impact of arrests for marijuana sales upon property crime rates are contained in Table 3, with estimates again obtained after correcting for autocorrelation. In this case, only the rate of burglaries is adversely affected by an increase in marijuana sales arrests. Again, several effects may be at work. First, arrests for sales can be expected to disrupt supply and lead to price increases. Users may therefore rely upon burglary to cope with these increases. Second, if the risks of selling become too great for some, they may switch to burglary as an alternative criminal activity that has the potential to be more economically rewarding and to have less risk than is typical of larceny and motor vehicle theft. Third, this outcome may result from the shift in use of scarce police resources from enforcement of laws related to non-drug crimes to enforcement of drug laws, drug investigations and drug arrests. The impact of a standard deviation increase in sales arrests is small, with the typical county experiencing an increase of only 7 reported burglaries per year. The quantitative impacts of Enforcement, Unemployment

Rate, and Annual Wage upon Burglary, Larceny, and Motor Vehicle Theft are nearly identical to those reported in both Table 2.

Table 4 presents estimates of the impact of arrests for marijuana sales on reported rates of homicide and arrests for the possession of hard drugs.<sup>21</sup> No autocorrelation corrections were required for these estimates. Although there are many models in the literature designed to explain variation in homicide rates, most fail to include interactions between law enforcement and illegal drug activities. As discussed earlier, the arrest of sellers may disrupt established supply channels and lead to violent confrontations between rival groups seeking to replace those recently arrested. While this process is underway, homicides may increase, and not decline to previous levels until stable geographical supply relationships are reestablished. Consistent with this supply disruption hypothesis, when counties increase their arrests for selling marijuana, they experience an increase in homicides during that time period. There is an insignificant decrease in the following period. These results suggest information about the enforcement of laws against selling drugs would be an appropriate addition to models formulated to explain cross-section or time series variation in homicides. It is also apparent, however, that the general model developed above to explain rates of property-related crimes is less suited when applied to homicides. The  $R^2$  value is much lower and among the other variables only the Annual Wage is significantly related to homicides.

Even though significant contemporaneous effects are not present, lagged arrests for marijuana sales are found to have significant effects on hard drug possession. Two explanations are possible. First, some users may substitute hard drugs for marijuana when supplies are cut off, leading to greater participation in hard drug markets and additional hard drug possession

---

<sup>21</sup> Not surprisingly, arrest for only the possession of marijuana was not related to homicides. Only current marijuana possession is positively related to hard drug possession, making it difficult to distinguish drug-substitution effects among users from a more general increase in law enforcement actions against drug possession.



arrests. Second, some former sellers of marijuana may assess the risk of arrest as being significantly higher and therefore acquire hard drugs as a prelude to selling them to replace income lost from reduced marijuana sales. Subsequently, they are more likely to be arrested for hard drug possession. These results provide little support for the gateway theory to justify greater anti-marijuana enforcement since supply disruptions are associated with increases, not decreases, in hard drug activity in later periods. Hard drug possession crimes are also found to increase when the unemployment rate increases or the average annual wage declines.<sup>22</sup>

#### **4. Summary and Conclusions**

This analysis has assessed the impacts of marijuana arrests, conditions in local labor markets, and local law enforcement arrest rates upon rates of several non-drug crimes and hard drug possession in the United States. The results indicate that marijuana arrests are positively associated with higher levels of both violent (homicide) and property crime during the 1994-2001 period. Improvements in enforcement ratios for total Part I crimes also contributed to lower rates of property crime. Counties with declining unemployment rates experienced higher rates of burglary and arrests for hard drug possession, while increases in average annual wages led to lower rates of all types of crime assessed.

These findings suggest that the recent focus on marijuana law enforcement has been counterproductive for addressing non-drug crime. By removing the legal restrictions against possessing marijuana and ending its sale in the underground economy, the results indicate that

---

<sup>22</sup> Blackley and Shepard (2005) discuss two concerns with estimates from models designed to explain crime rates as a function of drug law enforcement: (1) possible simultaneity between reported non-drug crimes and drug arrests; and (2) omission from the model of a measure of drug use. In both cases, they cite a growing literature that demonstrates the appropriateness of treating arrest variables as exogenous (Levitt, 1998; Benson et al., 1998, 2001; and Miron, 1999) and the lack of association between drug use and crime separate from the case in which drug activity is illegal (Rasmussen and Benson, 1994; Mast, et al., 2000; Resignato, 2000); and Miron, 2003). Corman and Mocan (2000) found a small positive association between drug use proxies and property crime, but no association with violent crime.

fewer burglaries, larcenies, and motor vehicle thefts are likely to be committed. A similar result also holds for marijuana sales with respect to the incidence of arrests for homicide and hard drug possession.

If it is the illegality and arrests for these drug market activities, rather than the usage of marijuana per se, that is the root cause of other crimes, then there is considerable evidence that crime will not be adversely affected by a relaxation of laws against marijuana. The empirical results imply that non-drug crime rates may decline because law enforcement resources may be directed against other criminal activity when marijuana arrests are given a lower priority. In addition, users would not need to finance higher-priced marijuana that occurs with supply disruptions, and sellers would not pursue alternative crime opportunities if the risk of arrest for the sale of marijuana declines. At a minimum, resources allocated to marijuana law enforcement do not appear to benefit society by reducing non-drug crime or by reducing participation with other illicit drug markets. Given the current policy emphasis against marijuana sales and possession, it is evident from these findings that further assessments of the costs of marijuana prohibition are needed.

## References

- Becker, Gary S. and Kevin M. Murphy (1988), "A Theory of Rational Addiction," *Journal of Political Economy*, 96 (4, Aug.), 675-700.
- Bennett, William (1990), "Should Drugs Be Legalized", Reprinted in Schaler, J. (Ed.) *Drugs*, 63-67. Amherst, NY: *Prometheus Books*.
- Benson, Bruce L. and David W. Rasmussen (1991), "The Relationship Between Illicit Drug Enforcement Policy and Property Crimes," *Contemporary Policy Issues*, IX (Oct.), 106-115.
- Benson, Bruce L., Iljoong Kim, David W. Rasmussen, and Thomas W. Zuehlke (1992), "Is Property Crime Caused by Drug Use or by Drug Enforcement Policy," *Applied Economics*, 24, 679-692.
- Benson, Bruce L., Iljoong Kim, and David W. Rasmussen (1998), "Deterrence and Public Policy: Tradeoffs in the Allocation of Police Resources," *International Review of Law and Economics*, March, 77-100.
- Benson, Bruce L., Ian S. Leburn, and David W. Rasmussen (2001), "The Impact of Drug Enforcement on Crime: An Investigation of the Opportunity Cost of Police Resources," *Journal of Drug Issues*, 31, 989-1006.
- Brumm, Harold J. and Dale O. Cloninger (1995), "The Drug War and the Homicide Rate: A Direct Correlation?," *Cato Journal*, 14 (3, Winter), 509-517.
- Corman, Hope and H. Naci Mocan, (2000) "A Time-Series Analysis of Crime, Deterrence, and Drug Abuse in New York City" *The American Economic Review*, 90, (3), June, 584-604.
- Drug Policy Alliance (2003), *State of the States: Drug Policy Reforms, 1996-2002* available at <http://www.drugpolicy.org/statebystate/sosreport>.

Duke, Steven B. and Albert C. Gross (1993), *America's Longest War: Rethinking our Tragic Crusade Against Drugs*, New York: G.P. Putnam's Sons.

Earleywine, Mitch (2005) **Understanding Marijuana: A New Look At The Scientific Evidence**, New York: Oxford University Press.

Friedman, Milton (1991), "The War We Are Losing," in *Searching for Alternatives: Drug-Control Policy in the United States*, Melvyn B. Krauss and Edward P. Lazear, eds., Stanford, California: Hoover Institution Press, 53-67.

**Getman, Jon B. (2005), "Crimes of Indiscretion: Marijuana Arrests in the United States" Norml Organization Research Paper, Washington D.C. available at: [http://www.norml.org/pdf\\_files/NORML\\_Crimes\\_of\\_Indiscretion.pdf](http://www.norml.org/pdf_files/NORML_Crimes_of_Indiscretion.pdf).**

Goldstein, 1985 "The Drugs/Violence Nexus: A Tripartite Conceptual Framework", *Journal of Drug Issues*, v. 39, pp 143-174

Kleiman, M.A.R. (1992). *Against Excess*. New York, NY: Harper Collins Basic Books.

Kuziemko, Ilyana and Steven D. Levitt (2001), "An Empirical Analysis of Imprisoning Drug Offenders," Working Paper 8489, Cambridge, MA, *National Bureau of Economic Research*.

Levitt, Steven D. (1998), "Why Do Increased Arrest Rates Appear to Reduce Crime: Deterrence, Incapacitation, or Measurement Error?" *Economic Inquiry*, 36, July, 353-372.

Markowitz, Sara (2000) "An Economic Analysis of Alcohol, Drugs, and Violent Crime in the National Crime Victimization Survey," Working Paper 7982, *National Bureau of Economic Research*.

Mast, Brent D., Bruce L. Benson, and David W. Rasmussen. 2000. "Entrepreneurial Police and Drug Enforcement Policy," *Public Choice* 104(3): 285-308.

Miron, Jeffrey A. and Jeffrey Zwiebel (1995), "The Economic Case Against Drug Prohibition," *Journal of Economic Perspectives*, 9(4, Fall), 175-192.

Miron, Jeffrey A. (2001), "Violence, Guns, and Drugs: A Cross-Country Analysis," *Journal of Law and Economics*, XLIV(2, pt 2), 615-634.

- Miron, Jeffrey A. (1999), "Violence and the U.S. Prohibitions of Drugs and Alcohol," *American Law and Economics Review*, 1-2, Fall, 78-114.
- Miron, Jeffrey A. (2003), "A Critique of Estimates of the Economic Cost of Drug Abuse," Manuscript. Boston, MA: Department of Economics, Boston University.
- Miron, Jeffrey A. (2005), "The Budgetary Implications of Marijuana Prohibition," Manuscript. Boston, MA: Department of Economics, Boston University.
- Nadelmann, E. (1988). The case for legalization. *Public Interest* 92: 3-17.
- National Research Council (2001) *Informing America's policy on illegal drugs*. Washington, DC: National Academy Press.
- Office of National Drug Control Policy (2000), Drug Policy Information Clearinghouse Fact Sheet, "Drug Related Crime," Washington, ONDCP: 1-6.
- Polinsky, Mitchel and Shavell, Steven (1984), "The Optimal Use of Fines and Imprisonment," *Journal of Political Economy*, June: 89-99.
- Raphael, Steven and Rudolph Winter-Ebmer (2001), "Identifying the Effect of Unemployment on Crime," *Journal of Law and Economics* 44, April, 259-283.
- Rasmussen, David W. and Bruce L. Benson (1994), *The Economic Anatomy of a Drug War*. Maryland: Rowman and Littlefield.
- Resignato, Andrew J. (2000), "Violent Crime: A Function of Drug Use of Drug Enforcement," *Applied Economics*, 32, 681-688.
- Sentencing Project (2001) *Drug Policy and the Criminal Justice System*, (2001) available at <http://www.sentencingproject.org/pdfs/5047.pdf>
- Sentencing Project (2002): *U.S. Prison Populations—Trends and Implications*, available at <http://www.sentencingproject.org/pdfs/1044.pdf>.
- Shepard and Blackley (2005), "Drug Enforcement and Crime: Recent Evidence from New York", *SOCIAL SCIENCE QUARTERLY*, 86: 2, June 323-342.

Silverman, Lester P. and Nancy L. Spruill (1977), "Urban Crime and the Price of Heroin," *Journal of Urban Economics*, 4, 80-103.

Stigler, George (1970), "The Optimum Enforcement of Laws," *Journal of Political Economy*, May-June: 526-36.

U.S. Department of Justice (2002). Office of Justice Programs, Bureau of Justice Statistics, Prison Statistics. Available at [www.ojp.usdoj.gov/bjs/prisons.htm](http://www.ojp.usdoj.gov/bjs/prisons.htm).

U.S. Department of Justice (2002). Drug Enforcement Agency *Speaking Out Against Drug Legalization* available at (<http://www.usdoj.gov/dea/demand/speakout/07so.htm>.)

U.S. Department of Justice (2002) Office of Justice Programs, Bureau of Justice Statistics, "Drug Use and Crime", available at <http://www.ojp.usdoj.gov/bjs/DCF/duc.htm>

U.S. Department of Justice, Federal Bureau of Investigation (2002). *Uniform Crime Report 1981, and 1992-2002*. Washington, DC: FBI National Press Office. Available at [www.fbi.gov/ucr/ucr.htm](http://www.fbi.gov/ucr/ucr.htm).

U.S. Department of Justice, Federal Bureau of Investigation (1984), *Uniform Crime Reporting Handbook*, Washington, DC.

Wilson, J.Q. (1990). Against the Legalization of Drugs. Reprinted in Schaler, J. (Ed.) *Drugs*, 49-62. Amherst, NY: *Prometheus Books*.

Witte, Ann (1980), "Estimating the Economic Model of Crime with Individual Data," *Quarterly Journal of Economics*, February: 57-84.

Table 1: Data Summary

Variable	Unit of Measure	Sample Mean	Standard Deviation
Burglary	Burglary arrests per thousand	6.79	4.01
Larceny	Larceny arrests per thousand	19.11	11.71
Motor Vehicle Theft	Motor Vehicle Theft arrests per thousand	1.86	1.94
Homicide	Homicide arrests per thousand	0.04	0.07
Hard Drug Sales	Non-marijuana drug sales arrests per thousand	0.51	0.76
Hard Drug Possession	Non-marijuana drug possession arrests per thousand	1.13	1.72
Marijuana Sales	Marijuana sales arrests per thousand	0.36	0.58
Marijuana Possession	Marijuana possession arrests per thousand	2.43	3.58
Enforcement	Part I arrests per reported crime	0.27	0.39
Unemployment Rate	Unemployment rate in %	5.60	3.13
Annual Wage	Annual wage in thousands of \$	23.28	5.32

N=9359: 1337 counties, 1995-2001. See the Appendix for sample selection methods and the data sources used.

Table 2: Marijuana Possession Regressions			
Crime Equation:	Burglary	Larceny	Motor Vehicle Theft
Explanatory Variables			
Marijuana Possession	0.030 (0.025)	0.145** (0.054)	0.015** (0.005)
Lag(Marijuana Possession)	0.011 (0.020)	0.016 (0.046)	-0.002 (0.005)
Enforcement	-0.372* (0.178)	-0.916* (0.485)	-0.151+ (0.095)
Unemployment Rate	0.064** (0.022)	-0.001 (0.044)	-0.002 (0.007)
Annual Wage	-0.093** (0.023)	-0.197** (0.052)	-0.052** (0.010)
R <sup>2</sup>	0.878	0.936	0.930
Notes: Coefficient standard errors are in parentheses. ** (*) (+) indicates coefficient is significantly greater than 0 at the 0.01 (0.05) (0.10) level.			



Table 3: Marijuana Sales Regressions			
Crime Equation:	Burglary	Larceny	Motor Vehicle Theft
Explanatory Variables			
Marijuana Sales	0.124* (0.059)	-0.146 (0.132)	-0.017 (0.013)
Lag(Marijuana Sales)	0.050 (0.041)	-0.025 (0.090)	0.003 (0.019)
Enforcement	-0.372* (0.179)	-0.903* (0.481)	-0.150+ (0.095)
Unemployment Rate	0.062** (0.022)	-0.004 (0.045)	-0.002 (0.007)
Annual Wage	-0.093** (0.015)	-0.201** (0.053)	-0.053** (0.010)
R <sup>2</sup>	0.879	0.936	0.930
Notes: Coefficient standard errors are in parentheses. ** (*) (+) indicates coefficient is significantly greater than 0 at the 0.01 (0.05) (0.10) level.			

Table 4: Additional Marijuana Sales Regressions		
Crime Equation	Homicide	Hard Drug Possession
Explanatory Variables		
Marijuana Sales	0.006* (0.003)	-0.029 (0.050)
Lag(Marijuana Sales)	-0.002 (0.002)	0.114** (0.045)
Enforcement	-0.003 (0.003)	-0.017 (0.027)
Unemployment Rate	$2.89 \times 10^{-4}$ ( $7.65 \times 10^{-4}$ )	0.034** (0.014)
Annual Wage	$-1.23 \times 10^{-3+}$ ( $8.20 \times 10^{-4}$ )	-0.021+ (0.016)
R <sup>2</sup>	0.388	0.674
Notes: Coefficient standard errors are in parentheses. ** (*) (+) indicates coefficient is significantly greater than 0 at the 0.01 (0.05) (0.10) level.		

## APPENDIX

### SAMPLE SELECTION METHODOLOGY

Although there are over 3000 counties in the U.S., the final sample contains 1337 counties. Those omitted satisfy one of the criteria from (a) – (f) below.

- a. Counties in states with no or incomplete data for arrests or reported crimes: Florida, Illinois, Kentucky, Mississippi, Montana, South Dakota, Wisconsin.
- b. Counties in states for which State Police data were not reported or not allocated by county: Alaska, Connecticut, Vermont.
- c. Counties with changing boundary definitions during the 1994-2001 period.
- d. Counties in reporting jurisdictions that cover multiple counties because (1) the data were allocated only to the county with the largest population; or (2) the data were allocated in proportion to each county's population share.
- e. Counties for which either total Part I arrests or reported crimes are equal to zero.
- f. Counties for which the Coverage Indicator is less than 50 percent during any year. The Coverage Indicator represents the proportion of county-level data not imputed. For example, in the simplest case, if a county provided 8 months of data for variable z, an annual value would be computed as  $12z/8$ . If the number of months is fewer than 6 in any year, the data for that county was omitted. This is similar, but not identical, to the algorithm used prior to 1994.

SOURCE: U.S. Department of Justice, Federal Bureau of Investigation. UNIFORM CRIME REPORTING PROGRAM DATA [UNITED STATES]: COUNTY-LEVEL DETAILED ARREST AND OFFENSE DATA, 2001. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [producer and distributor], 2003.

### CRIMINAL OFFENSE DEFINITIONS

Part I Offenses: criminal homicide, forcible rape, robbery, aggravated assault, burglary, larceny-theft, motor vehicle theft, arson.

Definitions of Components of CRIME:

1. ASSAULT (aggravated assault): an unlawful attack by one person upon another for the purpose of inflicting severe or aggravated bodily harm. This type of assault usually is

accompanied by the use of a weapon or by means likely to produce death or great bodily harm.

2. MURDER (criminal homicide): the willful (non-negligent) killing of one human being by another.
3. ROBBERY: the taking or attempting to take anything of value from the care, custody, or control of a person or persons by force or threat of force or violence and/or by putting the victim in fear.
4. BURGLARY: the unlawful entry of a structure to commit a felony or a theft
5. LARCENY (theft): the unlawful taking, carrying, leading, or riding away of property from the possession or constructive possession of another.

## Part II, Drug Abuse Categories:

1. Hard Drug Possession
  - a. opium or cocaine and their derivatives (morphine, heroin, codeine)
  - b. synthetic narcotics-manufactured narcotics which can cause true drug addiction (Demerol, methadone)
  - c. dangerous non-narcotic drugs (barbiturates, Benzedrine)
2. Marijuana Sales, Marijuana Possession

SOURCE: U.S. Department of Justice, Federal Bureau of Investigation, *Uniform Crime Reporting Handbook* (Washington, DC: 1984).

## **SOURCES OF VARIABLES USED**

1. Average wage: Bureau of Economic Analysis, U.S. Department of Commerce.
2. County unemployment rates are from the Local Area Unemployment Statistics (LAUS), Bureau of Labor Statistics (BLS).
3. County Crime and Drug Arrest Data from the FBI Uniform crime reports, available at the University of Michigan, National Archive of Criminal Justice Data (NACJD).