Illegal Drug Use And Public Policy

One can support the war on drugs' goal of reducing consumption without supporting the war itself.

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ABSTRACT: The period from the 1980s to the present has witnessed a lively and unsettled debate concerning the legalization of marijuana, cocaine, heroin, and other illicit substances in the United States. Proponents of legalization argue that the demand for these harmful and potentially addictive substances is not responsive to price. Opponents argue that prices will fall tremendously in a regime characterized by legalization and that the option of legalization and taxation is not feasible. In this paper we summarize theoretical and empirical evidence suggesting that none of these propositions is correct.

From the 1980s to the present a lively debate has taken place concerning the legalization of marijuana, cocaine, heroin, and other illegal drugs in the United States. Opponents argue that legalization of these potentially addictive goods would reduce their prices. By the law of the downward-sloping demand function, their consumption would rise, as would the harmful effects associated with increased use. Foes of legalization assert that these effects may be substantial. Some proponents of legalization adopt the conventional wisdom that the consumption of illegal addictive substances is not very responsive to price. Others are willing to trade off an increase in consumption for reductions in the violence, crime, and other costs of the current regime.

The present situation is especially grim. The United States spends approximately $26 billion a year on its war on drugs, whose aim is to apprehend and punish drug dealers and users. Ten percent of all arrests are for nonviolent drug offenses. Forty percent of drug arrests are for possession of marijuana. Twenty percent of those

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arrested are juveniles, and the actual number of youths arrested rose more than 80 percent between 1993 and 1997. Drug offenders account for 25 percent of the U.S. prison population. Largely because of the war on drugs, the per capita number of prisoners more than doubled between 1985 and 1997. The U.S. imprisonment rate for drug offenses (149 per 100,000 population in 1995) exceeds the rates of most Western European nations for all crimes (for example, 95 per 100,000 population for France in 1995). Almost all drug offenders in U.S. prisons committed nonviolent crimes. Although racial patterns in drug use do not differ markedly, nonwhites account for almost 75 percent of drug offenders in prison.[1] These costs of the war on drugs have been compounded by the spread of HIV and AIDS among intravenous drug users.

In this paper we address three of the most contentious issues in the legalization debate. First, we summarize recent evidence that casts doubt on the contention made by proponents of legalization that the demand for illegal drugs is not responsive to price. Second, we question the assertion made by opponents of legalization that prices will fall tremendously if drug consumption is legalized. Finally, we question the argument of opponents that the option of legalization and taxation is not feasible. We raise the possibility that the market price of drugs with an excise tax could be greater than the price induced by a war on drugs, even when producers could ignore the tax and produce substances illegally underground.

As the reader may already have gathered, our aim is to debunk myths concerning the price-sensitivity of drug consumption, the effect of legalization on price, and a regime in which drugs are legal but taxed in much the same way that cigarettes and alcohol are taxed. Thus, our aim is to provide "grist for the policy mill" rather than to conduct a full cost-benefit analysis of legalization and taxation. In raising alternatives to the current regime, we realize that the consumption of the addictive substances at issue generates external costs (harm to others), and we ignore internal costs (harm to self).

One can support the drug war's goal of reducing consumption without supporting the war itself. Moreover, changes in perceptions concerning drug consumption and in the political climate suggest that there are alternatives worth considering. Increasingly, drug abuse is viewed as a disease to be addressed by treatment and prevention rather than as illegal behavior to be addressed by the criminal justice system. State initiatives to decriminalize the possession of small amounts of marijuana in the 1970s were followed by initiatives to legalize the use of marijuana for medical purposes in the 1990s. According to *Gallup* polls, the percentage of Americans who favored legalization of marijuana use rose from 18 percent in

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1973 to 31 percent in 1999.[2] These developments highlight the timeliness of a discussion of the "sacred cows" adopted by proponents and opponents of drug legalization.

Trends

To put studies of the effects of drug prices on consumption in perspective, we examine trends in cocaine, marijuana, and heroin prices in the United States from 1981 to 2000. While these are not the only three substances used illicitly, they are the three for which data are available for long periods of time (Exhibit 1). Moreover, marijuana has been the most widely used illicit substance since the early 1970s, and cocaine was the second most widely used substance during much of the period considered here.

These real prices (the money price of each substance divided by the Consumer Price Index for all goods) are based on purchases made by drug enforcement agents to apprehend drug dealers as recorded in the System to Retrieve Information from Drug Evidence (STRIDE) maintained by the Drug Enforcement Administration (DEA) of the U.S. Department of Justice. Despite large allocations of resources to interdiction and criminal justice as part of the federal war on drugs, the real price of one pure gram of cocaine fell by 50 percent, and heroin, 37 percent, between 1981 and 2000. Most of the
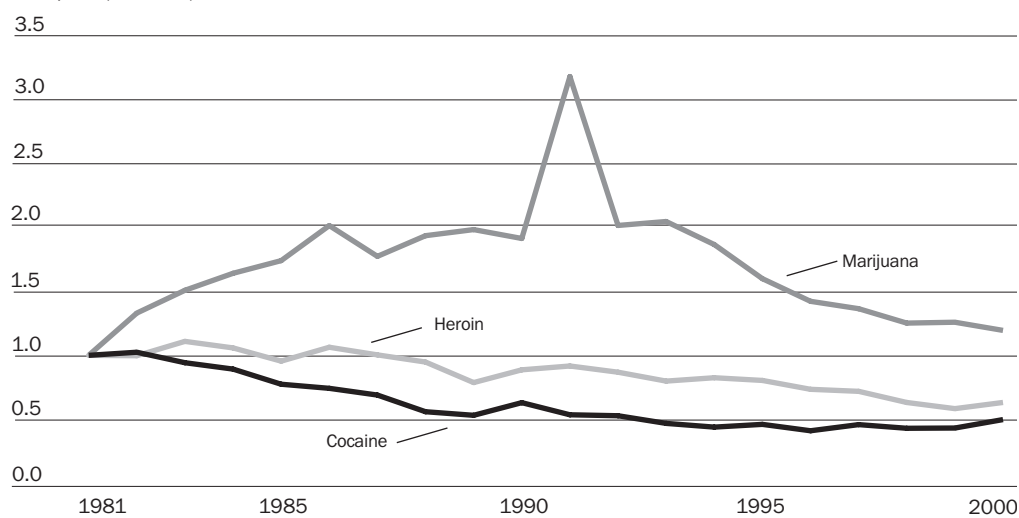
EXHIBIT 1

Trends In Real Prices Of One Gram Each Of Pure Cocaine, Pure Heroin, And Marijuana, 1981–2000

SOURCE: P. Johnston, R. Kling, and W. Rhodes, "The Price of Illegal Drugs: 1981–2000" (Working paper, Abt Associates, 2001).
NOTE: Real prices are the money prices of each substance divided by the Consumer Price Index (CPI) for all goods.

cocaine price decline took place in the 1980s; the price of heroin was fairly stable until 1987 and fell thereafter.

The real price of marijuana shows a different trend. It increased by almost 20 percent during the period as a whole. This overall upward trend can be decomposed into an expansion from 1981 to 1991, followed by a decline. The price more than tripled in the earlier period but declined by more than 60 percent in the later period.

■ **Decline in real price of cocaine.** The decline in the real price of cocaine has attracted the most attention in the popular press. Researchers have pointed to a number of causal factors.[3] One was the development of the production sector and the results of learning by doing that followed the reintroduction of cocaine into the U.S. market in the early 1970s after a long period of absence. Much of the learning-by-doing phenomenon may have taken the form of techno-logical progress in evading law enforcement. A second factor was vertical integration, which reduced the number of levels in the chain of distribution and the cost of wholesaling and retailing. In addition, there was a shift to low-cost labor as the professionals who dealt cocaine in the 1970s were replaced by unemployed inner-city resi-dents in the 1980s. Finally, the degree of competition in the illegal cocaine industry may have increased over time. While there is little "hard" empirical evidence to support these explanations, Suren Basov and colleagues have found that the 25 percent decline in the relative wage of low-skilled labor since 1979 can account for ap-proximately 20 percent of the decline in the real price of cocaine since that year.[4]

■ **Implications for the war on drugs.** The downward trend in the real price of cocaine that has accompanied the upward trend in resources allocated to enforcement does not mean that the war on drugs has been a failure. Using data for cities during 1985–1996, Ilyana Kuziemko and Steven Levitt have found that cocaine prices are positively related to the certainty of punishment, as measured by per capita drug-offense arrests, and the severity of punishment, as measured by the fraction of drug arrests that result in the criminal's being sentenced to prison.[5] On balance, however, the rise in enforce-ment has been swamped by other factors.

■ **Connection between price and use.** Elsewhere, we have examined trends in the use of cocaine, heroin, and marijuana since 1981.[6] Space limitations prevent us from including that material. Here we note that several trends suggest that the number of persons who use illegal drugs rises as the real prices of these substances fall. More definitive evidence on this issue is contained in the studies discussed below.

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Demand Studies

Economists use price elasticity of demand to summarize the magnitude of the response in consumption to a change in price. This is defined as the percentage change in consumption caused by a 1 percent change in price. For example, a price elasticity of demand of −0.5 means that a 10 percent reduction in price causes a 5 percent increase in consumption.

"Own-price" effects or elasticities are concerned with changes in the consumption of a certain good as the price of that good changes; "cross-price" effects or elasticities are concerned with changes in the consumption of a good as the prices of other goods vary. If the cross-price elasticity of cocaine, for example, with respect to the price of marijuana is positive, marijuana and cocaine are substitutes in that consumption of cocaine falls and consumption of marijuana rises when the price of marijuana falls. If the cross-price elasticity is negative, the two goods are complements in that a reduction in the price of marijuana causes the consumption of both to rise. Cross-price effects or elasticities are relevant in evaluating a policy to legalize marijuana but not cocaine or heroin. They also are relevant because legalization may have impacts on the consumption of cigarettes and alcohol.

Some theoretical and empirical analyses of the demand for harmful substances such as cigarettes, alcohol, cocaine, heroin, marijuana, and opium employ a conventional framework that ignores the addictive properties of these substances. Others explicitly incorporate addiction, forward-looking behavior, and linkages between past and future consumption.[7] For our purposes, all of these approaches predict that illegal drugs should exhibit downward-sloping demand functions.

Most of the studies reviewed here use city- and year-specific illegal drug prices from STRIDE and self-reported drug use from the National Household Survey on Drug Abuse or the Monitoring the Future national survey. Typically, the outcomes are past-year or past-month participation and frequency of use, given positive participation. At the individual level, the elasticity of participation with respect to price can be interpreted as the percentage increase in the probability of use caused by a 1 percent reduction in price. In a fixed population, this elasticity also shows the percentage increase in the number of users caused by a 1 percent reduction in price.

■ **Own-price effects.** *Cocaine.* Estimates in several studies of the price elasticity of demand for cocaine participation in the past year range between −0.41 and −1.00.[8] These estimates imply that a 10 percent reduction in price would cause the number of people who

use cocaine to rise by between 4 percent and 10 percent. The price elasticity of the frequency of annual use conditional on positive use falls between −0.35 and −0.44. That is, a 10 percent reduction in price would cause the number of occasions on which a participant uses cocaine to rise by approximately 4 percent.

The largest price elasticities emerge from studies that are limited to teenagers and young adults, which implies that this group is more sensitive to price than are adults or the general population. This finding has important policy implications because the prevalence of illegal drug use is highest among persons ages 17–29. Since few people initiate drug use after age twenty-nine, the most effective way to curtail consumption in all segments of the population may be to prevent initiation and consumption among youths and young adults.

The studies just cited do not consider consumption by the homeless and by prison inmates, who may behave very differently from the population at large. Jonathan Caulkins, however, reports an even larger price elasticity of demand for cocaine (−2.50) using data on the percentage of persons arrested and brought to booking facilities in various U.S. cities who tested positive for cocaine based on urine specimens.[9] Caulkins also finds an elasticity of the number of hospital emergency department mentions for cocaine with regard to price of −1.30 in an annual U.S. time series for 1978–1996.[10] These two studies suggest that heavy users may be more, rather than less, price-sensitive than the general population.

Marijuana. Marijuana has been the most widely used illicit substance in the United States since data first became available in the early 1970s. Marijuana price-elasticity estimates are particularly important in light of the reduction in participation between 1978 or 1979 and 1992 and the increase since then. Rosalie Pacula and colleagues present a fairly wide range of estimates of marijuana participation price elasticities for high school seniors but indicate that a conservative lower-bound figure is −0.30.[11] Their upper-bound figure of −0.69 may be too small given the measurement error in price discussed in the study. They also show that the upward trend in price between 1982 and 1992 and the downward trend between 1992 and 1998 can explain at least part of the "1980s' marijuana recession" and the "1990s' expansion."

■ **Cross-price effects and the "gateway hypothesis."** Unlike the studies that contain estimates of own-price effects or elasticities, many fewer definitive conclusions can be drawn from the recent literature on cross-price effects or elasticities. In light of the popularity of the "gateway hypothesis," which postulates that marijuana is a stepping stone to harder drugs, researchers have focused on the impacts of marijuana price changes on the consumption of

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other addictive substances. Cigarettes and alcohol have been included in the set of substances whose consumption may be affected by changes in illegal drug prices in light of the negative consequences associated with the consumption of these legal addictive goods.

Some of the research in this area capitalizes on the decriminalization of the possession of small amounts of marijuana by eleven U.S. states between 1973 and 1978. Presumably, this reduced the full price of marijuana (the sum of the money price and the expected penalty for conviction of use).

John DiNardo and Thomas Lemieux have found that decriminalization had a negative effect on the prevalence of alcohol use by high school seniors, which suggests that alcohol and marijuana are substitutes for one another.[12] Their study provides supporting evidence that increases in state minimum legal drinking ages in the 1980s raised the prevalence of marijuana use. But decriminalization had no impact on the prevalence of marijuana. Clifford Thies and Charles Register have obtained results suggesting complementarity between marijuana and alcohol and between marijuana and cocaine; the use of both substances was higher among persons who resided in decriminalized states.[13] As in the DiNardo-Lemieux study, no firm conclusions can be drawn because marijuana prevalence was not affected by decriminalization.

Studies that use money prices tend to find complementarity. Henry Saffer and Frank Chaloupka have conducted the most comprehensive investigation of money cross-price effects because they estimate demand functions for alcohol, marijuana, cocaine, and heroin that contain the money price of each substance except marijuana.[14] Their results are consistent with complementary relationships among these substances in the sense that a reduction in the price of one of these substances increases the use of all of them. But the absence of a marijuana price from the demand functions limits to some extent the generalizability of their estimates.

Proponents of the gateway hypothesis argue that youth and young adult substance users progress from the legal (at least for adults) substances of cigarettes and alcohol to marijuana and then to cocaine and other hard drugs. Positive cross-sectional correlations among these substances or findings of correlations between early cigarette and alcohol use and later marijuana use or between early marijuana use and later hard-drug use shed little light on this hypothesis. Temporal precedence and statistical correlation are only necessary conditions for establishing causality because these correlations may reflect unobserved individual factors such as the propensity to engage in risky behavior.

Jeffrey DeSimone studies the effect of past marijuana use on cur-

rent cocaine use using a technique that is meant to eliminate the correlation between unobserved factors and marijuana use.[15] He has found that prior use of marijuana increases the probability of using cocaine by more than 29 percent, even after one controls for unobserved individual characteristics. This is the strongest evidence to date in support of the gateway hypothesis.

■ **Expected penalty effects.** The expected penalty for possessing an illegal drug, defined as the probability of apprehension and conviction multiplied by the fine or monetary value of the prison sentence for conviction, raises the full price of the substance confronted by the user. We already have referred to the impacts of the decriminalization of the possession of small amounts of marijuana by eleven states between 1973 and 1978 in our discussion of cross-price effects. DiNardo and Lemieux and Thies and Register have found no effects of this development on marijuana participation, while Chaloupka and colleagues and Saffer and Chaloupka have reported positive effects of decriminalization on participation.[16] The mixed results may arise because nearly every state liberalized its treatment of marijuana possession in the 1970s.

Chaloupka and colleagues and Matthew Farrelly and colleagues have shown that marijuana and cocaine use are negatively related to state fines for conviction of possession.[17] These effects are weak, most likely because the probability of apprehension and conviction is low. For example, according to the former study, doubling the fines for marijuana possession would reduce the probability of marijuana use by high school seniors by less than 1 percent.

Policy Implications

It appears that we have added fuel to the fire of the advocates against legalization. After all, the weight of the empirical evidence is that demand functions for illegal drugs, like demand functions for other goods, slope downward. Youths and young adults appear to be more responsive to price than older adults are. This is troubling, because the former group may discount the future most heavily and may be most susceptible to the type of time-inconsistent behavior described by Jonathan Gruber and Botond Köszegi.[18] Moreover, price elasticities for heavy users are larger than those for the general population, although these results must be interpreted with caution because they are based on small samples and sometimes inferred from outcomes related to consumption.

The magnitudes of the effects or elasticities often are substantial, especially for teenagers and young adults. For example, according to the cited study by Grossman and Chaloupka, a 10 percent reduction in the price of cocaine would cause the number of youths and young

adults who use cocaine to grow by approximately 10 percent and would increase the frequency of use among users by a little more than 3 percent.[19] According to the study by Pacula and colleagues, the same 10 percent reduction in the price of marijuana would raise the number of high school seniors who use marijuana by 3 percent.[20] This is smaller than the cocaine price response but may be a lower-bound estimate because the price of marijuana is subject to more measurement error than is the price of cocaine. Even if the price elasticity of marijuana participation were as low as −0.3, legalization might provoke a large increase in the number of users if there were as much as a fifteenfold decline in price, as predicted by Mark Moore.[21]

There is some evidence that illegal drugs, cigarettes, and alcohol are complements, which implies that the use of all of these substances would increase if marijuana were legalized. Finally, reductions or eliminations in expected penalties imposed on users also would stimulate demand.

■ **Impact of legalization on prices.** Two factors add fuel to the fire of the advocates for legalization. The increase in consumption that accompanies legalization depends on the price elasticity of demand and on the magnitude of the price reduction caused by the removal of penalties for production and distribution. Published studies suggest extremely large price reductions: seventyfold in the case of heroin, twentyfold in the case of cocaine, and fifteenfold in the case of marijuana.[22]

Jeffrey Miron's extremely careful and detailed empirical analysis indicates, however, that these estimates are overstated.[23] He compares the markup from raw material (which he terms "farmgate") to retail for cocaine and heroin to such legal products as chocolate, coffee, tea, beer, spices, tobacco, and potatoes. While retail cocaine and heroin prices are many times the costs of the raw materials required to produce them, markups also are large for these legal goods, although smaller than those for cocaine and heroin. These data suggest that the black-market price of cocaine is 2.5–5 times larger than the price that would prevail if it were legalized, while the black-market price of heroin is 8–19 times larger than the price in a legal market. Miron reaches similar conclusions based on prices of cocaine, morphine, and heroin used for legal purposes. He attributes these results to evasion of costs by black-market suppliers. These costs include taxes on labor and capital; costs associated with environmental, safety, health, and labor-market regulation; and advertising costs. The avoidance of these costs by black-market suppliers offsets some but not all of the expected penalties imposed by the government on these suppliers. While the impact on price is smaller than suggested by previous analysts, Miron's estimates still imply

that legalization would result in significant reductions in drug prices and, consequently, large increases in drug use.

■ **Legalization and taxation.** A second factor that throws even more fuel onto the pro-legalization fire is that a regime in which drug production and consumption are fully legal, but drug use is discouraged by excise taxes on production or consumption, has not been and should be evaluated. Monetary taxes have been considered a poor substitute for a drug war because excise taxes have been assumed to be unable to reduce drug use as much as a war on drugs can. The argument is that producers could always choose to go "underground" and sell illegally if a monetary tax made legal prices higher than underground prices.

In preliminary research, Gary Becker and colleagues have shown that the market price of drugs with a monetary excise tax could be greater than the price induced by a war on drugs, even when producers could ignore the monetary tax and produce substances illegally underground.[24] This is because the government could allocate resources to preventing production in the illegal market. In effect, it imposes a nonmonetary tax in this market whose expected value exceeds the tax in the legal market. Becker and colleagues conclude that in certain circumstances the threat of imposing a cost on illegal producers that is above the excise tax if they produced legally is sufficient to discourage illegal production. Hence, the threat does not have to be carried out on a large scale and is much less costly to implement than is a war on drugs when drugs are illegal.

Excise taxes imposed on producers or consumers of drugs play the same role when drugs are legal as do expected penalties imposed on producers and consumers when drugs are illegal. Both raise the full price of consumption and reduce the quantity demanded. But excise taxes are simply transfers, while penalties and efforts to enforce and evade them use real resources. Hence, social welfare potentially is greater in a regime in which drugs are legal and taxed. Tax revenue could be redistributed to the population in a lump-sum fashion or used to fund drug treatment and prevention programs. In the long run, legalization might lead to a lower level of consumption than the present situation.

■ **Deterring youth consumption.** To address the problem of consumption by youths, legalization and taxation could be combined with minimum-purchase-age laws already in place for alcohol and cigarettes. Even if these laws are partially evaded, the higher money price of drugs that might characterize the legalization regime might be a powerful deterrent to youth consumption. Legalization eliminates the current expected penalty costs imposed on users. The latter costs are much higher for adults than for youths because

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adults place a higher value on their time and youths are much more likely to heavily discount the future effects of their current decisions. Hence, an increase in money price accompanied by the elimination of prison terms, community service, and the acquisition of a police record for possession would raise the full or effective price of drugs faced by youths even if this price fell for adults.

WE HAVE NOT PROVIDED ENOUGH EVIDENCE to conclude definitively that the use of cocaine, marijuana, and other illicit substances should be legalized. We have, however, highlighted three factors that have been ignored or not emphasized in the debate concerning legalization. The first is that legalization of all drugs or legalization of marijuana is likely to increase consumption greatly if prices fall by as much as that suggested by many contributors to the debate. The second is that these price reductions, while almost certainly sizable, may have been greatly overestimated. The third is that legalization and taxation—the combined approach that characterizes the regulation of cigarettes and alcohol—may be better than the current approach.

Clearly, more research on the characteristics of the taxation and legalization regime is required before it can be recommended. We hope, however, that we have convinced the reader to treat with great skepticism the propositions that the demand for illegal drugs is not sensitive to price; that tremendous price reductions will occur if drugs are legalized; and that legalization and taxation is not a feasible policy option.

NOTES

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2. Bureau of Justice Statistics, *Sourcebook of Criminal Justice Statistics 2000.*
3. Jonathan P. Caulkins, Carnegie Mellon University, personal communication with Michael Grossman, 15 May 1995; and S. Basov et al., "Prohibition and the Market for Illegal Drugs: An Overview of Recent History" (Working Paper,

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4. Basov et al., "Prohibition and the Market for Illegal Drugs."

5. I. Kuziemko and S. Levitt, "An Empirical Analysis of Imprisoning Drug Offenders" (Working Paper, University of Chicago, 2001).

6. M. Grossman et al., "Illegal Drug Use and Public Policy" (Working Paper, City University of New York Graduate Center, 2001).

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12. J. DiNardo and T. Lemieux, "Alcohol, Marijuana, and American Youth: The Unintended Effects of Government Regulation," *Journal of Health Economics* 20, no. 6 (2001): 991–1010.

13. C.F. Thies and C.A. Register, "Decriminalization of Marijuana and the Demand for Alcohol, Marijuana, and Cocaine," *Social Science Journal* 30, no. 4 (1993): 385–399.

14. Saffer and Chaloupka, "The Demand for Illicit Drugs."

15. J. DeSimone, "Is Marijuana a Gateway Drug?" *Eastern Economics Journal* 24, no. 2 (1998): 149–164.

16. DiNardo and Lemieux, "Alcohol, Marijuana, and American Youth"; Thies and Register, "Decriminalization of Marijuana"; Chaloupka et al., "The Demand for Cocaine and Marijuana by Youth"; and Saffer and Chaloupka, "The Demand for Illicit Drugs."

17. Chaloupka et al., "The Demand for Cocaine and Marijuana by Youth"; and Farrelly et al., "The Joint Demand for Cigarettes and Marijuana."

18. Gruber and Köszegi, "Is Addiction 'Rational'?"

19. Grossman and Chaloupka, "The Demand for Cocaine by Young Adults."

20. Pacula et al., "Marijuana and Youth."

21. M.H. Moore, "Supply Reduction and Drug Enforcement," in *Drugs and Crime*, ed. M. Tonry and J.Q. Wilson (Chicago: University of Chicago Press, 1990), 109–157.

22. For a summary of these studies, see J. Miron, "The Effect of Drug Prohibition on Drug Prices" (Working Paper, Boston University and Bastiat Institute, 2001).

23. Ibid.

24. G.S. Becker, M. Grossman, and K.M. Murphy, "The Simple Economics of the War on Drugs" (Working Paper, University of Chicago, 2001).

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