The Effect of Drug Decriminalization in Portugal on Homicide and Drug Mortality Rates

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"Decriminalizing drugs is even more urgent now than in 1972, but we must recognize that the harm done in the interim cannot be wiped out, certainly not immediately. Postponing decriminalization will only make matters worse, and make the problem appear even more intractable."

--Milton Friedman, 1989, in an open letter to Bill Bennett

Introduction

The above statement made by Milton Friedman in his open letter to the Director of the Office of National Drug Control Policy in 1989 highlights the divisiveness of drug prohibition in economic and policy circles. Over twenty years later, economists and policy makers still have not resolved the question of what an appropriate drug control regime should look like. Drug prohibition is a staple of criminal justice systems worldwide, with a few notable exceptions, and indeed the international community has expressed its commitment to prohibition in numerous treaties and other agreements. While existing policies prohibiting drugs are designed to protect the public from the health and security risks associated with drug use, the prevalence of illicit drug use remains high, and many economists attribute externalities such as increased crime and violence to the large black market for illicit drugs. The economic theory surrounding drug prohibition and other possible drug control regimes is ambiguous, and there have been only a handful of experiments with alternative drug control frameworks since the 1961 adoption of the Single Convention of Narcotic Drugs from which to gather empirical data. With deaths in Mexico from drug war-related violence numbering in the tens of thousands since Felipe Calderón launched his 2006 offensive against trafficking organizations, numerous U.S. states

considering measures which would decriminalize marijuana, and a commission of former Latin American heads of state calling for the legalization of drugs, it is now more important than ever to assess the potential effects of the liberalization of drug control policies.

The multiplicity of possible drug control policies can be divided into three broad categories: legalization, prohibition, and decriminalization. Prohibition is by far the most prevalent of national drug control regimes, and means a set of policies which establish criminal penalties for both the production (manufacture and distribution) and consumption (possession and personal use) of drugs. Prior to the 20th century, most countries had de facto legalization, in which neither the supply nor demand side of the drug market were criminalized, and drugs could be legally manufactured and sold to consumers. Drug decriminalization (or depenalization), while representing a level of drug enforcement intermediate between legalization and strict prohibition, is really sort of a "third way" in terms of its relationship to the economic theory. Under a decriminalization regime, the use of drugs and their possession for personal use are legal, or they are addressed as administrative or health issues rather than going through the criminal court system. As opposed to legalization, which liberalizes both the demand and supply side of the drug trade, enabling drug transactions to occur in a legally regulated fashion, decriminalization addresses only the demand side of drug prohibition. Under decriminalization, a user who is caught might be subject only to a warning, fine, or recommended or compulsory medical treatment. The manufacture and distribution of drugs remains illegal. The expected effect of decriminalization, in terms of the economic theory, is therefore highly ambiguous: pressure on the demand side is lessened (in the absence of increased drug education or treatment programs), while the supply of drugs remains confined to the black market. Increased demand due to the reduced deterrence of user sanctions, in the absence of a supply-side solution, should

mean even greater negative externalities associated with the drug trade, according to those opposed to decriminalization. Many economists, on the other hand, see any reduction in drug enforcement as easing pressure on the illicit drug trade, potentially reducing violence and making it easier to offer treatment to addicts. The statement from Milton Friedman which begins this paper speaks to this perspective, but also notes the concern that in the short term, the decriminalization of drugs may have undesired consequences as a positive demand shock to the illicit drug market.

Drug policy is an issue frequently taken up by economists, both because of the complexity of the economic theory surrounding it and its importance in the scope of public policy. A 2007 survey of American economists by Mark Thornton finds that most economists favor some change to current American drug policy, with the largest number in support of a decriminalization regime (Thornton 2007). Thornton's results are rather curious, because most of the theory and research on the issue of drug policy has contrasted prohibition with legalization, and the effects of decriminalization remain largely unstudied. Previous analysis has focused predominantly on the effect of drug enforcement on crime or other variables, often using drug enforcement spending or quantities of drug seizures as a proxy. But the complexity of factors associated with a change in drug control regime – including public knowledge of the legal status of drugs, user sensitivity to criminal penalties, and the dynamics of the illicit drug market – as well as the sparseness of data surrounding decriminalization events, means that economists and policy makers have been able to give little more than speculation as to the potential results of transitioning from prohibition to a decriminalization framework. Rather than examining the effects of drug enforcement levels, arrest rates, or other measures of police activity, this paper concerns itself with the question, "What are the effects of a policy change to decriminalization as

such?" To address this question, this paper looks to one of the few natural experiments with decriminalization since the Single Convention on Narcotic Drugs (and the one only so far this century) – the Portuguese experience, which began in 2001 with the decriminalization of all drugs.

This paper examines the Portuguese experience with drug decriminalization in light of the economic theory surrounding drug control policies. In the literature review section, this paper considers the economic theory of the deterrence effect of criminal penalties as a basis for understanding the effect of drug control policies, as well as subsequent analysis which calls some aspects of this theory into question. In addition to literature concerning theory, empirical analyses of the effects of drug enforcement and the available literature on the Portuguese decriminalization experience are discussed in this section. Following the literature review, this paper presents an econometric analysis of the effect of Portuguese drug decriminalization on homicide and drug mortality rates.

Using a difference in differences model, this paper finds a positive correlation between decriminalization in Portugal and both homicide and drug mortality rates relative to other European Union countries. The estimated coefficients are found to be statistically significant at the five percent level based on the standard errors computed with the Newey-West method, although there is reason to believe these estimates for the standard errors may not be sufficiently robust. For this reason, statistical inference based on the results of the analysis in this paper is not possible. Nonetheless, the results suggest that decriminalization may not have been desirable in the Portuguese case, which is indeed consistent with a body of literature that offers much support for legalization, but little theoretical basis for decriminalization. In the discussion section, this paper considers possible explanations for the Portuguese data and urges economists to be

cautious when advocating decriminalization as a compromise between prohibition and legalization.

Literature Review

Drug prohibition has long placed economists, and especially those favoring economic liberalism, at odds with policy makers. The primary economic argument against drug prohibition is that as long as demand for drugs exists, the market will supply them – if not through legal channels, then through a gray or black market. The illegal drug trade, according to the theory, not only results in efficiency losses (which would be viewed in a positive light by policy makers hoping to reduce drug consumption), but also numerous negative externalities ranging from public health consequences of unregulated drugs to violence associated with black market conflict resolution. But despite the negative impact of drug prohibition suggested by the theory, economists still do not reach a consensus on moving away from a prohibition framework, or on what an alternative drug control regime should entail. Mark Thornton's 2007 survey of American economists finds that a narrow majority of contemporary economists support the liberalization of drug policies, with 58% of respondents who had an opinion favoring either decriminalization or legalization of drugs (Thornton 2007). From a theoretical perspective, the negative externalities of a black market must be balanced against those of increased drug consumption, which should result from legalization or weaker enforcement of drug control policies. Thornton's paper does not, as might be expected from this theoretical basis, show economists polarized between complete legalization of drugs and even more stringent enforcement of drug laws; instead, the option favored by the most economists surveyed – including over two thirds of the economists who indicated support for some sort of liberalization – is decriminalization.

The economic literature surrounding the issue of drug decriminalization breaks down into two main categories: the theoretical literature, which underlies the deterrence theory of criminal justice and the effect of criminal sanctions on the illicit drug market specifically, and case studies which empirically examine the effect of enforcement and policy on variables related to the drug trade. Notable in both these bodies of literature is the ambiguity of competing effects which might influence the externalities associated with illegal drug distribution, including effects on usage rates (which lag effects make difficult to study in the Portuguese case at this time), pressure on drug suppliers, and police effectiveness. This section will first address the theoretical literature and will then consider the empirical work which attempts to verify how these economic processes play out in practice.

Any analysis of the effects of a change in drug control regime must begin with Gary Becker's canonical work "Crime and Punishment: An Economic Approach", published 1974. In his paper, Becker outlines his theory of deterrence, which has since been the primary basis for evaluating criminal justice policy from an economic perspective. Becker argues that the while criminal sanctions may be viewed by many as the means by which society metes out justice or retribution, their primary function in terms of public policy is to deter criminal acts (Becker 1974). Criminal sanctions, along with enforcement variables which determine the likelihood of a criminal being apprehended, represent an additional cost to would-be law-breakers who must weigh the benefit they gain from criminal activity against the possibility of imprisonment or other penalties. According the Becker, this is the only direct way for public policy to influence crime rates given a set of economic and social conditions. From this perspective, decriminalizing drugs or reducing penalties or enforcement will lead to an increase in drug consumption, because drug users will face a lower cost associated with drug use. Essentially, lower user penalties

means shifting up the demand curve for drugs; Becker's deterrence theory would suggest decriminalization would lead to greater negative externalities associated with the drug trade. Subsequent papers have called into question the effect of criminal penalties on user preferences (and therefore use) and raised the issue of whether user penalties might exacerbate problems of addiction and violent conflict resolution.

While Becker bases his model on the intuitive idea – formulated earlier by the utilitarian Jeremy Bentham – that criminal penalties should be understood as deterring potential criminals from breaking the law, Justin McCrary argues in "Dynamic Perspectives on Crime" that Becker's static model may not be valid for analyzing crimes punished by prison sentences (McCrary 2010). McCrary notes that since the displeasure associated with incarceration occurs over a period of time, considering a criminal's decision to break the law as a point-in-time bet might overstate the expected deterrence effect of prison sentences. In their paper "The Deterrence Effect of Prison: Dynamic Theory and Evidence", Lee and McCrary find that the sharp increase in potential prison terms for Florida offenders at age 18 was not associated with a strong deterrence effect (Lee and McCrary 2009). In the case of user penalties for drugs, however, potential prison sentences are likely to be short, so the extent to which dynamic considerations are relevant is unclear. Nonetheless, there are reasons why Becker's theory of criminal deterrence may not be totally applicable to criminal drug use penalties even in a static framework.

The 2008 NBER working paper "What Do Economists Know about Crime" looks back on economic theory regarding crime and punishment, and especially the deterrence effect of criminal penalties (Dills et al. 2008). Dills et al. find that the effect of many deterrence variables on crime (such as severity of penalties, arrest rates, and the existence of capital punishment) is

small or even ambiguous. These conclusions may simply reflect the extraordinary difficulty of measuring the almost always endogenous variables associated with crime and punishment, but could also indicate that economic theory regarding the deterrence effect is incorrect or incomplete. For example, many criminals may have time-inconsistent preferences which result in valuing immediate gratification over potential criminal sanctions in the future, or criminals may simply erroneously evaluate their risk of arrest and prosecution. Especially in the case of consumption of illicit drugs which are often addictive, low elasticities of consumption might mean that drug consumers' preferences are not substantially affected by criminal penalties. The sensitivity of drug consumers to price does not necessarily refute this contention, because drug consumers may have hard income constraints which restrain their consumption even if they would be willing to bear the risk cost associated with arrest. Robert MacCoun and Rosalie Pacula examine whether drug users are even aware of decriminalization policies in a 2009 paper, finding that similar proportions of the population believe they could face jail time for marijuana possession between U.S. states with and without decriminalization (MacCoun et al. 2009). A subsequent paper by Pacula et al., on the other hand, finds that marijuana prices do respond to decriminalization in a way which would suggest the classical theory of deterrence applies (Pecula et al. 2010).

While reducing user penalties or decriminalizing should be expected to have at least some positive effect on drug consumption, which in turn should mean a larger market in illicit drugs and greater negative externalities associated with it, Dills et al. also point out that drug enforcement can increase tension in the drug market and lead to increased violence (Dills et al. 2008). Dills et al. outline the longstanding economic argument against drug prohibition, that the lack of a legal method for conflict resolution means that economic agents instead resolve

business disputes through violence. The paper makes reference to the American experience with crack cocaine in the 1980s, in which violence surged as traffickers fought for distribution territory in the emerging crack market, but the paper also goes further, arguing that violence will persist in a black market even after initial property rights are assigned. Dills at al. find a positive correlation between drug enforcement spending and homicide in the United States, but the paper does not address whether user penalties should affect violent crime through this mechanism.

In his 2001 paper "Violence, Guns, and Drugs: A Cross-Country Analysis", Jeffrey Miron examines the relationship between quantities of drug seizures and homicide rates and also provides some theoretical insight as to how user penalties might affect crime rates. Miron explains that one mechanism by which drug enforcement might increase homicides is by "crowding out" other law enforcement activities (Miron 2001). This could mean police are preoccupied with enforcing drug laws and therefore neglect property crime, which leads to extrajudicial conflict resolution, or that violent inmates may be released earlier if people incarcerated for drug use or possession are crowding the prison system. Nonviolent drug users could also be made more likely to commit violent crime by being incarcerated with more serious offenders. Drug prohibition, and even user penalties, could also increase violent crime by making drug users unwilling to resolve unrelated disputes through legal means. Miron cites the example of a drug user who is the victim of a robbery, but takes matters into his own hands instead of reporting the robbery to police for fear of facing penalties for drug possession. This effect is more likely in a case where users may face stiff criminal penalties, as was the situation in Portugal prior to decriminalization. Even still, the size or even existence of each of these effects remains speculation; the bulk of the arguments presented by Miron in his paper concern the

supply side, on which user penalties put little stress. Miron's empirical analysis finds that drug seizures correlate strongly and positively with homicide rates.

While papers such as those by Miron and Dills et al. have traced a connection between drug enforcement and homicide rates, economists have had few opportunities to examine the effect on homicide rates (or on other negative externalities of the illicit drug trade) of decriminalization as such. In his 2001 book *Drug War Heresies: An Agnostic Look at the Legalization Debate*, Robert MacCoun examines the Italian decriminalization experience. Italy decriminalized all drugs in 1975 in response to increased mafia involvement in the illicit distribution of heroin, then recriminalized in 1990 before again removing criminal user sanctions (administrative sanctions still exist) in 1993. Like Portugal, Italy adopted a medical approach to dealing with drug addiction, offering more treatment services to addicts and also allowing for compulsory treatment. Because of limited data availability from the Italian case, MacCoun is only able to look at the effects of decriminalization on drug mortality rates and not on homicide rates or other variables, which is especially unfortunate considering the role of organized crime in motivating Italy to decriminalize. MacCoun finds that drug deaths did in fact increase under decriminalization, decline after recriminalization, and then increase again after user sanctions were removed in 1993 (MacCoun and Reuter 2001). These results could mean that decriminalization increased drug mortality, i.e. that the indirect positive effect of decriminalization on drug deaths via usage rates outweighed the negative effect on drug deaths of expanded addiction treatment programs. Like any real-world case study, however, a multitude of other factors, with regional drug use trends likely most important among them, could have confounded these results. MacCoun notes in particular that drug mortality could be understood as a lagged indicator of drug prevalence, complicating the results. Additionally, trends in drug

arrests and addicts in treatment – both of which are ambiguous with regard to drug usage rates, since they could indicate either greater prevalence or stricter enforcement – could explain the variation. MacCoun also compares the trend in Italian drug mortality to those of Spain and Germany, concluding that decriminalization did not have a large effect on Italian drug deaths. While MacCoun certainly does not disavow decriminalization in light of the Italian experience, this singular work in the empirical literature seems to suggest that decriminalization might not hold the answers to the problems associated with drug prohibition.

Many other countries have implemented full or partial decriminalization over the years, including Spain, in which no personal use or possession is criminalized, and Peru, which allows for personal possession and use of both marijuana and cocaine. What separates Portugal from these other cases is the rapid reversal in Portuguese drug policy from criminalized use (with users facing prison sentences of up to one year) to the full decriminalization of all drugs. The Paper, "What Can We Learn from the Portuguese Decriminalization of Illicit Drugs" gives an excellent account of the situation in Portugal leading up to decriminalization (Hughes and Stevens 2010). The authors explain that while Portugal has historically had low rates of lifetime drug usage, the country served as a gateway for the transport of illicit drugs from Latin America and North Africa. The 1990s saw the rise of intravenous heroin use and an associated rise in rates of HIV infection, as well as the inability of police to effectively enforce national drug control policies. Against this backdrop, Portugal revised its drug control policy to focus on addiction treatment and user dissuasion rather than criminal penalties. In 2001, Portugal decriminalized the use and possession for personal use of all drugs, with caught users being referred to Commissions for the Dissuasion of Drug Addition rather than facing criminal sanctions (Hughes

and Stevens 2010). The manufacture and distribution of drugs remains illegal, and traffickers face stiff criminal penalties.

In the years following decriminalization, the Portuguese experience was cautiously hailed by drug policy reform advocates as a success. In their paper on Portuguese decriminalization, Hughes and Stevens find modest increases in drug use following decriminalization, which they conclude from a descriptive analysis do not differ greatly from drug use trends in Spain and Italy, and revenue-generating crimes associated with drug use are not thought to have increased as a result of decriminalization (Hughes and Stevens 2010). While Portuguese decriminalization has certainly not had dire results for drug use rates, the question remains of the effect of decriminalization on the negative externalities associated with the trade of drugs in a black market setting.

Despite the wide support for decriminalization among economists, the theoretical literature is remarkably quiet with respect to the mechanisms by which criminal penalties for drug users might increase homicide or drug mortality rates. Becker's theory of the deterrent effect of criminal sanctions, even if it does not apply perfectly to drug markets, implies at least some positive effect of decriminalization on drug use and the corresponding externalities associated with the illicit drug trade. Of the arguments presented by Miron and others in favor of reducing drug enforcement or moving towards legalization, a preponderance deal with the supply side, and indeed seem to offer little theoretical basis for decriminalization except in being "less bad" than stricter paradigms of drug prohibition. Hughes and Stevens find that despite encouraging trends such as decreasing rates of drug use (except for cannabis) among Portuguese youth, decriminalization has still been accompanied by increased overall reported drug use and drug mortality (Hughes and Stevens 2010). It is unclear whether this represents a long-term

consequence of decriminalization which must be of primary importance to policy makers or only the "harm done in the interim" that Milton Friedman describes. The theoretical and empirical literature remains undecided on the merit of decriminalization – that is, the liberalization of only the demand side of the illicit drug market – as an alternative drug control regime to full legalization or prohibition.

Data

Annual data for the absolute number of homicides reported to the police and deaths attributed to drug dependence were gathered from the Eurostat statistical database for Portugal, Spain, Italy, France, the United Kingdom, Germany, and Sweden for the date range 1994-2008. Eurostat is the office of the European Union responsible for compiling statistics from member countries. Member countries are required to submit statistics which Eurostat assembles into a set of databases, most of which are presented annually. Spain, Italy, France, the United Kingdom, Germany, and Sweden were selected as the European Union countries with which to compare the Portuguese data because of their diverse drug control regimes, geographic proximity to Portugal, and data availability. The date range 1994-2008 was selected as the widest date range around the decriminalization event for which homicide and drug death data was available. The Eurostat database contained only absolute figures for homicides reported to the police, and the Eurostat figures for drug deaths per population were rounded to a single decimal place, so absolute numbers for homicides and drug deaths were taken from Eurostat and divided by midyear population as reported by the U.S. Census Bureau's International Database to produce datasets for the homicide and drug mortality rate per 100,000 population. Because variations in country

population are extremely small relative to variation in homicides and drug deaths, this is unlikely to affect standard errors in any noticeable way.

The Eurostat dataset for homicides reported to the police is assembled from statistics supplied by each of the member countries. The statistics come from official sources, either government ministries, statistical offices, or directly from police agencies. While statistics are recorded individually by member countries, the definition of what constitutes a homicide is standardized and does not, for example, include cases such as accidental death caused by an automobile accident or attempted homicide. Additionally, homicides are reported based on the number of victims and not the number of cases. While differences between countries in how crimes are recorded can make cross-country analysis based on the Eurostat databases problematic for some crimes, these problems are less likely to affect homicide data. Regressing the homicide data from Eurostat on similar data from the United Nations Office on Drugs and Crime showed strong consistency between the two datasets.

The Eurostat dataset for mortality due to drug dependence is assembled from deaths reported by member countries based on death certificates, which all European Union member countries are required to keep. The dataset gives the number of deaths for which drug dependence was the underlying cause of death, meaning cases in which a person was found to have ingested drugs but died from unrelated causes should be excluded. While Eurostat lists stringent guidelines and definitions for how member countries should report mortalities, comparing drug mortality data across countries is undoubtedly more problematic than comparing homicide data because of the subjective nature of determining what constitutes the underlying cause of death. Hughes and Stevens also point out that the number of reported drug deaths may vary on the prevalence and effectiveness of toxicological autopsies (Hughes and Stevens 2010).

Despite the potential pitfalls of the Eurostat dataset, it was the only available source for drug mortality data for Portugal and other European Union countries for the date range 1994-2008.

Midyear population data was gathered from the U.S. Census Bureau's International Database. The dataset represents population estimates based on available census data, national statistical offices, and projections based on the cohort-component method. Variation in population over the time range 1994-2008 is small relative to variation in homicides and drug mortalities and is used primarily to standardize the magnitude of variations in those variables between the observed countries.

Methodology

A cross-country analysis is complicated by the existence of a wide range of often unobservable, codependent variables which may remain constant or nearly constant within countries but vary greatly between them. Particularly in the case of homicide and drug mortality rates, differing initial conditions, as well as the absence of major changes to drug control policy outside of Portugal, would make a simple regression on a decriminalization variable or a ranking of the severity of user penalties inappropriate. For this reason, a difference in differences model was chosen, which is usually used to study the effects on an experimental group relative to a control group of a one-time treatment or event which affects only the experimental group. This model was used to analyze the effect of Portuguese decriminalization on homicide and drug mortality rates of Portugal in relation to Spain, Italy, France, the United Kingdom, Germany, and Sweden.

The difference in differences model takes as independent variables an indicator variable for the experimental group (in this case Portugal), an indicator variable for the time period after

the experimental event (here the time period beginning in 2001), and the product of those two variables, which indicates Portugal in the post-decriminalization period. The basic difference in differences model is specified below, where X_1 is an indicator variable for Portugal and X_2 is an indicator variable for the post-event time period:

$$Y = \beta_0 + \beta_1 * X_1 + \beta_2 * X_2 + \beta_3 * (X_1 * X_2) + \varepsilon$$

In the difference in differences model, β_1 captures initial differences between the experimental and control groups, β_2 captures the overall time trend in the control group, and β_3 captures the effect of the treatment event, in this case Portugal's decriminalization of all drugs. An advantage of the difference in differences model is that other control variables which might influence the dependent variable (demographic variables such as percent of population aged 18-25 and percent of population living in urban areas, for example, would generally be included in a model of homicide rates) do not need to be included, since initial differences in these conditions are captured by β_1 and variations are assumed to average out over the control group, provided no other major shocks occur.

The data were analyzed with the Stata statistical package. Histograms indicated that data points for homicide rates and drug mortality rates were not distributed normally, suggesting that a linear model might not be appropriate. The histograms of annual Portuguese homicide and drug mortality rates per 100,000 are shown below.
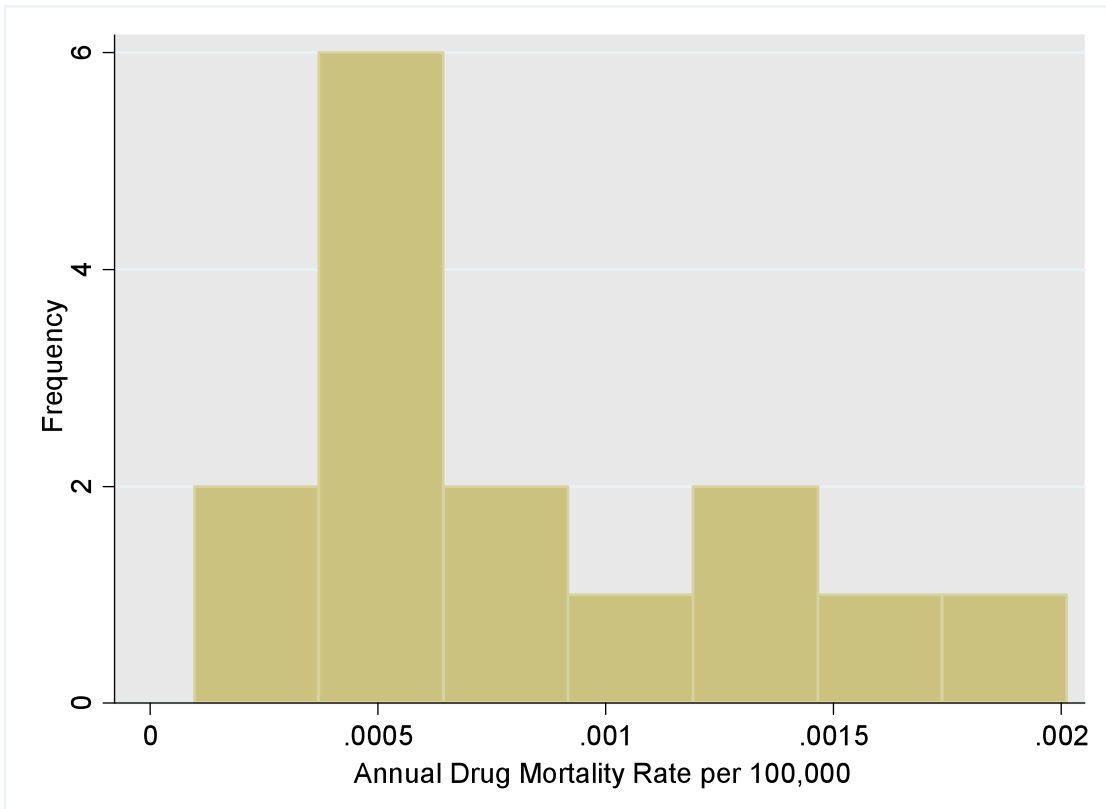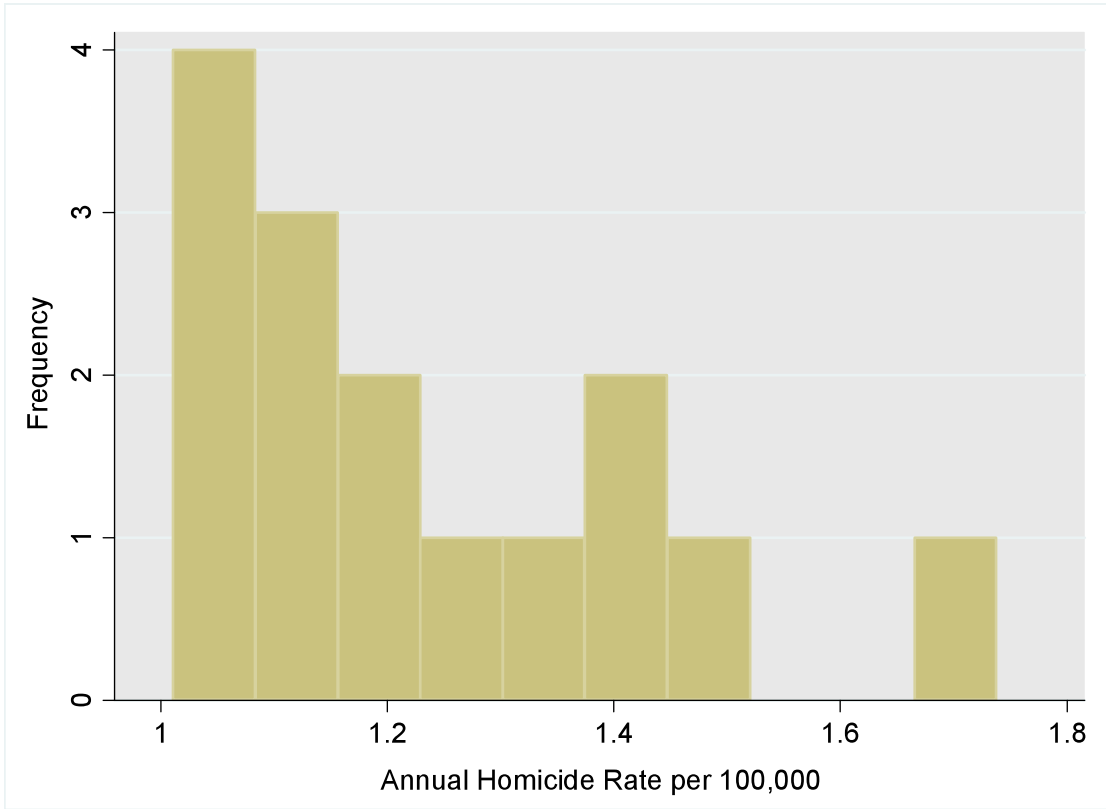
A Box-Cox test confirmed that the data did not closely resemble a normal distribution and indicated that a log model would be most appropriate. A log model also has the advantage of making interpretation of the β_3 coefficient more straightforward; in a difference in differences model taking the natural logarithm of homicide rates and drug mortality rates as dependent variables, β_3 represents the percent change in homicide and drug mortality rates associated with the decriminalization event. These models, which were the final models selected for the analysis, are specified below, where *portugal* is an indicator variable for Portugal, *postdecrim* is an indicator variable for 2001-2008, and *loghom* and *logmort* are the natural logarithms of the homicide and drug mortality rates per 100,000 population, respectively:

$$loghom = \beta_0 + \beta_1*portugal + \beta_2*postdecrim + \beta_3*(portugal* postdecrim) + \varepsilon$$

$$logmort = \beta_0 + \beta_1*portugal + \beta_2*postdecrim + \beta_3*(portugal* postdecrim) + \varepsilon$$

Weighting the data points by population was considered, but ultimately rejected, since the focus of the analysis is national homicide and drug mortality statistics. While a larger population does mean a larger sampling across which homicides and drug mortalities might occur, each country represents a fairly singular set of public policies, law enforcement practices, and data reporting techniques. Additionally, population weights made the data more difficult to analyze; a Box-Cox test on the weighted data found that neither a linear nor log model would be appropriate.

Standard errors were computed using the Newey-West estimator, allowing for one lag, in order to account for problems of autocorrelation over time. A cluster model was also considered, but the standard errors computed with this method were suspiciously close to zero, indicating that there were too few clusters for this approach to be valid. Although Stata natively computes

Newey-West standard errors only for time series data, the model can be easily adapted (as done in a user-made program) for panel data.

Results

Time series plots show a definite increase in both homicide and drug mortality rates in Portugal following decriminalization, both in absolute terms and relative to the average homicide and drug mortality rates of the other European Union countries included in the analysis – Spain, Italy, France, the United Kingdom, Germany, and Sweden. These plots, included below, seem to confirm the merit of a difference in differences model; while there appear to be time trends in both the Portuguese data and the data for the control group, Portuguese homicide and drug mortality rates increase and vary more wildly relative to European trends in the period after decriminalization. The time series plots below show the annual homicide and drug mortality rates per 100,000 for Portugal alongside the average annual rates for the other European Union countries considered in the difference in differences analysis. The vertical line indicates the decriminalization event, which occurred in 2001.
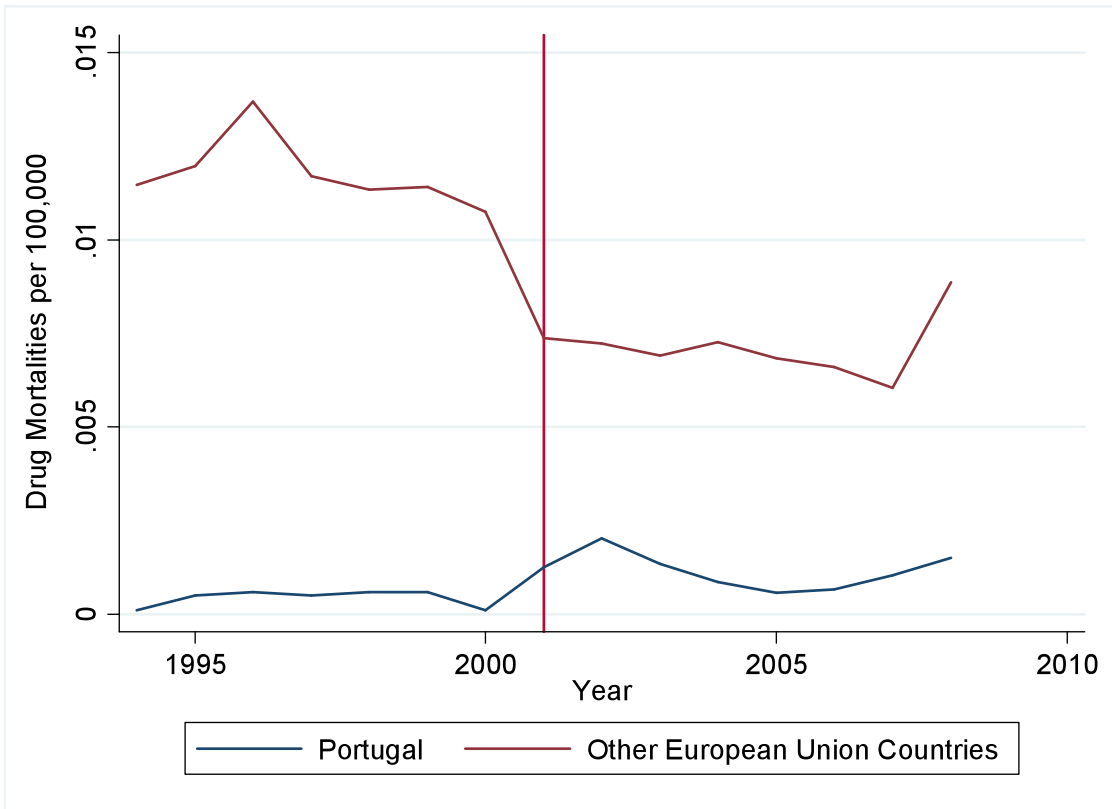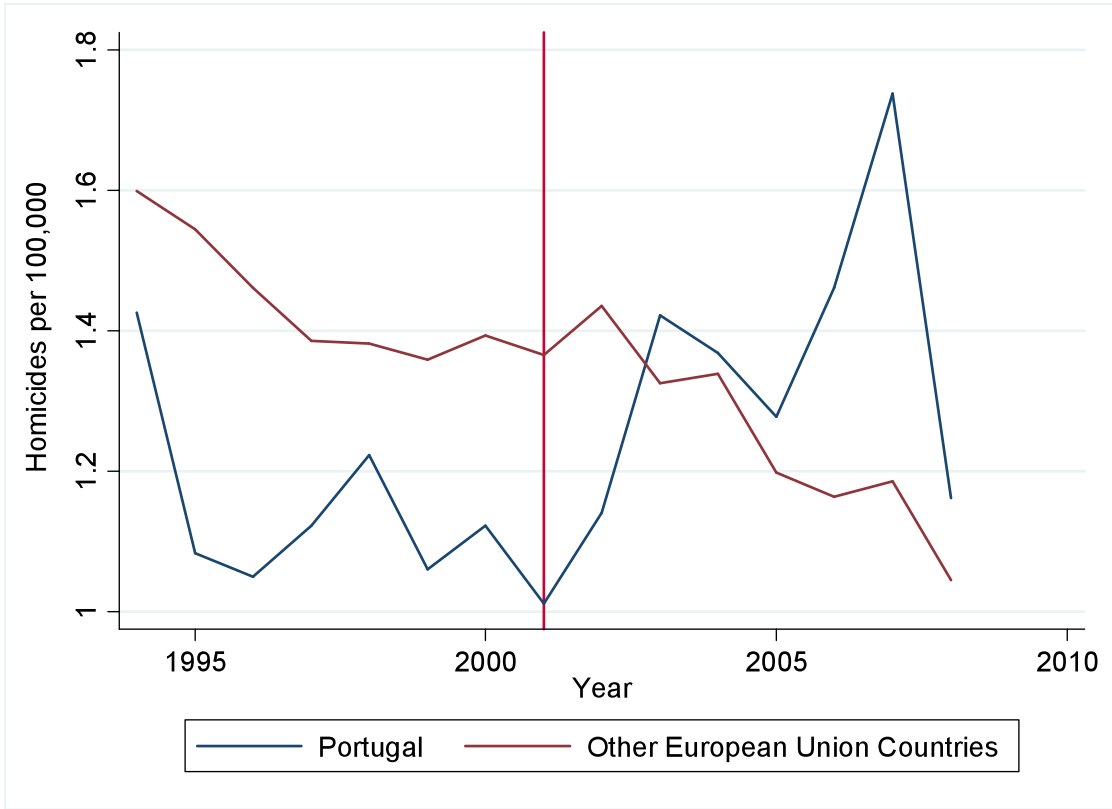
Using the differences in differences model, a positive correlation was found between Portuguese decriminalization and homicide and drug mortality rates relative to the other European Union countries. The results of the regressions with Newey-West standard errors are given in the tables below, with standard errors specified in parentheses after the coefficients:

Regression of the Natural Logarithm of Homicide Rate per 100,000

Variable	*portugal*	*postdecrim*	*portugal*postdecrim*
Coefficient	-.2048564 (.0589296)	-.1409689 (.0630015)	.2688225 (.0936628)
P>|t|	.001	.027	.005

Regression of the Natural Logarithm of Mortalities Attributed to Drug Dependence per 100,000

Variable	*portugal*	*postdecrim*	*portugal*postdecrim*
Coefficient	-3.278252 (.3501473)	-.5709044 (.2484841)	1.726749 (.4277735)
P>|t|	.000	.024	.000

The results indicate that drug decriminalization in Portugal was associated with an increase in both homicide and drug mortality rates relative to trends in the other European Union countries included in the dataset. Each of the effects was found to be statistically significant. The estimated coefficient for the effect of Portuguese decriminalization on the natural logarithm of the homicide rate per 100,000 was .2688225, indicating that Portuguese decriminalization was associated with an increase in the homicide rate of about 25% relative to the control group. The coefficient for the effect of decriminalization on the logarithm of the rate of mortality due to drug

dependence was estimated to be 1.726749, implying that decriminalization in Portugal was associated with an increase in drug mortality of over 150% relative to the control.

While not implying a causal link between decriminalization and an increase in homicide and drug mortality rates, the estimated coefficients both suggest a relationship between decriminalization and greater negative externalities associated with the illicit drug trade in the Portuguese case. The estimated coefficient for the effect of decriminalization on homicide rates was surprising, but believable. It suggests an increase in homicides which, if valid, should concern policy makers. The coefficient estimated for the effect of decriminalization on drug mortality is suspiciously high, implying an almost three-fold increase in drug deaths after decriminalization relative to the other European Union countries included in the regression, and is not plausible. Potential reasons for the extremely large coefficient estimated for the effect of Portuguese decriminalization on drug mortality will be addressed in the next section.

Discussion

This section of the paper will deal with three main topics: pitfalls of the research design which make statistical inference based on the results problematic, an interpretation of the results given their validity, and a discussion of the policy issues surrounding drug decriminalization.

Due to sparse data availability and the difficulty of conducting cross-country analysis based on data provided from different sources, only a handful of countries were included in the control group. Spain, Italy, France, the United Kingdom, Germany, and Sweden do represent a range of drug enforcement policies, but hardly comprise the entirety of the European Union. The small number of countries included in the analysis means that small shocks to individual countries might not average out over the control group, in which case the difference in

differences model fails. Additionally, the possibility for time trends specific to individual countries means that Newey-West standard errors may not be valid; indeed a simulation run in Stata with this type of autocorrelation produced standard errors consistently and significantly higher than the standard errors estimated using Newey-West. While the estimated coefficients provide some insight into the direction and size of the effects of Portuguese decriminalization on homicide and drug mortality rates, statistical inference based on the estimated standard errors is not necessarily valid. As such, it is not possible to affirmatively conclude based on these results that the observed increases in homicide and drug mortality rates in Portugal relative to the control countries were outside the bounds of normal variation. If the number of countries included in the control were greater, a cluster model could produce valid estimates for the standard errors, but this would probably require more countries even than all of the European Union member states. Including countries with such disparate conditions (especially drug-producing countries) would likely confound the results, and is certainly not possible at this time given the availability of the data. The results in this paper therefore represent an imperfect analysis of the sparsely available data.

Assuming the validity the estimated coefficients and standard errors, the results show a clear, positive correlation between decriminalization and homicide and drug mortality rates in the Portuguese case. A number of possibilities exist to explain this result (and to make a claim as to which of these effects occurred in actuality is beyond the scope of this paper), the most self-explanatory among them being that decriminalization really did exacerbate the negative externalities associated with the illicit drug trade relative to non-decriminalization. A likely mechanism for this effect is an increase in overall drug use, and therefore the size of the illicit market, as a result of the reduction of user penalties. This is an explanation supported by the

economic theory: users face a lower cost when choosing drug consumption, because they no longer suffer the risk of criminal prosecution. While many economists have noted the potential problems with a simple theory of criminal deterrence, including problems of incomplete information and time-inconsistent preferences, the merit of Becker's theory as a foundational approach to the effect of criminal penalties on crime rates is beyond question. Pecula et al.'s findings that marijuana prices in the United States do respond to user sanctions in a way which suggests that users consider the risk cost of prosecution also strengthens the claim that Becker's theory of deterrence applies to drug markets (Pacula et al. 2010). Decriminalization, when viewed through this lens, is precisely the wrong sort of drug market liberalization; instead of ameliorating supply-side tension which leads to violent conflict resolution, decriminalization might simply increase drug consumption and the size of the illicit market. Hughes and Stevens find increases in drug use in Portugal after decriminalization which do not greatly outpace drug use trends in Spain and Italy, but it is possible that even a small positive demand shock to the drug market might produce negative consequences (Hughes and Stevens 2010).

Even if decriminalization in Portugal caused the observed increases in homicide and drug mortality rates, such effects may only represent an adjustment period between strict prohibition and a decriminalization regime. Portugal's experiment is still young, and it is reasonable to believe that any sort of reorganization in the drug market might lead to increased use or violence. Hughes and Stevens do note an increase in reported lifetime drug use rates in Portugal after decriminalization, and these increases are proportionally larger than the increases in last 12-months use (Hughes and Stevens 2010). This could indicate that decriminalization increased potential users' willingness to experiment with drugs, either because it eliminated user penalties or because it increased acceptance of drug use in the Portuguese culture (notably, prevalence of

cannabis use increased the most after decriminalization). If this is the case, the results could represent only the short-term effects of the change of drug control regime. An increase in violent conflict resolution associated with a change in the nature of the illicit market, or difficulties of law enforcement agencies in adjusting to the change, could also account for a short-term increase in the homicide rate.

There is some evidence in the paper by Hughes and Stevens that the increases in negative externalities associated with the illicit drug market after decriminalization are short-term effects. While they find that overall reported drug use increased steadily after decriminalization, they also look at reported drug use among 15-16-year-olds and the incidence of problematic drug use. Drug use reported among 15-16-year-olds, according to Hughes and Stevens, increased in the years before decriminalization and immediately afterwards, but then started to decline (Hughes and Stevens 2010). They further argue that the decline in reported use among 15-16-year-olds from 2003-2007 was more marked than elsewhere in Europe. If the drug education and treatment efforts that accompanied decriminalization account for this change, drug use may decline as fewer young people try drugs. In terms of problematic drug use, Hughes and Stevens note that problematic drug use in Portugal fell since decriminalization, in contrast to Italy, in which problematic drug use increased over that time period. They suggest that while overall drug use has increased, the problematic drug use which causes the most social harm has decreased. This claim seems at odds with the estimated coefficient for the effect of decriminalization on drug mortality rates, but these data may be suspect.

Another possible explanation for the results is changes in reporting practices following decriminalization, and at least in the case of drug mortalities this seems likely. The magnitude of the coefficient for the effect of decriminalization on mortality is too high to be the result of

increased use at approximately the level found by Hughes and Stevens, especially in light of the

increased focus on addiction treatment that accompanied the decriminalization event. Unlike in

the case of homicides, for which different reporting practices are unlikely to have a great result

on the reported incidence, what constitutes a drug mortality is not necessarily an open-and-shut

question. Eurostat does give member countries specific guidelines for what should constitute a

mortality attributed to drug dependence – namely that drug dependence should be the underlying

cause of death as certified on the death certificate – but individual countries may differ in how

they make determinations of underlying cause of death. Technological or logistical barriers could

also result in drug deaths being attributed to other non-underlying causes. On the other hand,

doctors may list as a drug mortality a death in which drugs were found in the body, but did not

directly cause the death. Specifically in the Portuguese case, Hughes and Stevens note that

Portuguese drug mortality rates were in line with those of Spain and Italy until the mid 2000s

(Hughes and Stevens 2010). According to their paper, local agents explained the increase in

reported drug mortalities as stemming from a huge increase in the number of toxicological

autopsies performed – more than a two-fold increase from 2002 to 2008. A change in reporting

practices could explain the implausibly large coefficient estimated for decriminalization's effect

on drug mortality, and excluding the data points from the mid 2000s puts reported drug mortality

rates in Portugal more in line with European trends. It is possible that a change of reporting

practices could also have affected the estimated coefficient for the effect of decriminalization on

homicide rates, for example if police were better able to investigate violent crime under

decriminalization, but this paper finds no evidence of such an effect.

Also important to remember in the interpretation of these results is that they consider

only a single decriminalization event over a narrow band of time. Any number of time trends

within Portugal could have produced the observed relative increase in homicide and drug mortality rates, and such a trend would not be otherwise observable from the results of the difference in differences model. The results pertain only to the Portuguese experience with decriminalization, to the extent they are valid, and cannot be taken as evidence of more general effects of a change in drug control regime to decriminalization. Other changes in law enforcement policy, changes in public attitude, or demographic changes which might have occurred in tandem with decriminalization could have produced the observed effects, and decriminalization also did not occur in a vacuum. The Portuguese experience with decriminalization, as MacCoun points out for the Italian case, is a "natural experiment" and not a true experiment as such (MacCoun and Reuter 2001). Policy makers in Portugal designed the decriminalization policy in response to increased problems associated with the illicit drug trade, so in this way the decriminalization event itself may be endogenous to the homicide or drug mortality rate. Another point made by MacCoun in relation to the Italian case is applicable here: drug mortality should be thought of as a lagged indicator for drug use, meaning that an increase in drug mortalities may say more about preexisting drug use trends than about the immediate effects of decriminalization (MacCoun and Reuter 2001). The limitations of the analysis in this paper stem from the simultaneous complexity of examining empirical policy changes and dearth of decriminalization events available for study; unfortunately, these problems will likely persist until more countries take the risk of experimenting with decriminalization.

Full legalization of drugs, advocated by many economists including otherwise politically conservative members of the Chicago School, has a strong grounding in the economic theory. Violence stemming from the illicit drug trade (excluding revenue-generating crime, which could either increase under legalization due to increased drug use rates or decrease due to lower drug

prices) can be traced directly to the extrajudicial resolution of business disputes, because when disputes over property rights cannot be resolved through legal means, economic agents must establish alternative and potentially violent means of resolving these conflicts. Interesting in the current debate about the liberalization of drug policies, however, is that legalization rarely enters the discussion among mainstream economists and politicians; far more economists support decriminalization than legalization. Some of these economists may simply view decriminalization as a necessary transitional step to legalization as opposed to a viable drug control regime as such, but the economic theory provides at best tenuous rationale for the merit of decriminalization. Decriminalization means a liberalization of only the demand side of the illicit drug market. Looking to the classical theory, this should increase drug consumption by reducing the cost to users of consuming drugs. More recent literature has questioned the relevance of deterrence to the illicit drug market, and has suggested that the elimination of user penalties could reduce violence associated with the drug trade by allowing users more easily to resolve unrelated disputes through legal means. Nonetheless, decriminalization seems not to address the fundamental problem with drug prohibition most commonly cited by economists who advocate the liberalization of drug policies – a black market which entails violent conflict resolution and other negative externalities, such as a lack of regulation of product quality.

In terms of public policy, this paper cannot affirmatively argue for or against decriminalization as a rule; but the results, if valid, suggest that at least in the Portuguese case, decriminalization correlated with increased negative externalities associated with the illicit drug market relative to trends in Spain, Italy, France, the United Kingdom, Germany, and Sweden. The results cannot form the basis for a policy recommendation, but they should give economists who favor decriminalization pause. While the estimated coefficient for the effect of

decriminalization on drug mortality certainly overstates whatever effect may exist in actuality, it should nonetheless be particularly concerning. The increased focus on addiction treatment and the shift from criminal user penalties to a public health paradigm seem not to have succeeded in curbing drug mortality in the short term (although the reported drug mortality data is indeed suspect). The homicide rate also does not seem to have been lowered by decriminalization, which is consistent with the economic theory, although it is impossible to infer from the results that it necessarily increased outside the bounds of normal variation. These results, along with MacCoun's look at drug mortality during Italian decriminalization (which he notes is far from conclusive), point towards the idea that decriminalization may not represent a good alternative to legalization or prohibition. Despite the fact that so many economists favor decriminalization, the economic theory suggests that liberalizing only the demand side of the illicit drug market would likely do little to mitigate the negative externalities of that market, and could even exacerbate them by increasing drug use without easing supply-side market tensions. Economists may tend to shy away from espousing support for legalization simply because of its negative connotation in the public political discourse; but for those who truly believe that prohibition is unviable as a drug control regime, these results should suggest that legalization may be the only justifiable alternative.

Of course, there are a host of other considerations that must be taken into account when considering the liberalization of drug policy. While supported by the economic theory, the full legalization of drugs may not be politically viable. National drug control policy must be considered in the context of the international drug trade as well; legalization in one country or state could disrupt law enforcement activities of another or damage international relations. In the Portuguese case in particular, the country's status as a gateway for drug trafficking into the rest

of Europe could make full legalization problematic. Public opinion seems also to be wary of legalization. If the legalization of all drugs is politically unfeasible in the short term, decriminalization could function as a stepping stone to better drug control policies in the future. It is also important to remember that decriminalization affects individual people and not only macroeconomic variables. Personal liberty, the dubious morality of incarcerating drug users, and potential harm to civil-police relations are all arguments for the decriminalization of drugs which do not base in economic expediency.

The question of whether decriminalization has independent merit as a drug control regime remains far from settled. Neither MacCoun's treatment of the Italian case nor this paper provide authoritative evidence that decriminalization caused the observed increases in harms associated with the illicit drug trade. Decriminalization experiments such as Portugal's offer an opportunity for study, and without such experiments, it would be impossible to evaluate whether decriminalization is a viable alternative to prohibition or legalization. The economic theory regarding decriminalization is inconclusive, and it is only after observing more cases in which countries take the risk of decriminalizing that economists will be able to determine if, when, and how decriminalization should be implemented. Even for Portugal, more data will be required before decriminalization can be judged a success or failure. Problems of potentially inconsistent data reporting and the difficulties of estimating standard errors in such a model mean that the results found in this paper may be inaccurate, or they may reflect the short-term transitional effects of a change in drug control regime rather than the long-term effects of decriminalization. The passage quoted from Milton Friedman's open letter to the United States Drug Czar in 1989 raises this issue; there may be no easy solution to the problems associated with drug prohibition, and decriminalization may be initially painful even if it has long-term merit. The idea that a

systemic change in the market for illicit drugs might trigger transitional violence is supported in the economic theory; Dills et al. note that this concept underlies the "crack cocaine hypothesis" for the increase in violence in the United States during the 1980s, and they also make the point that such violence may occur even after the market's formative phase (Dills et al. 2008). The findings by Hughes and Stevens regarding decreases in youth drug use and problematic drug use in Portugal after decriminalization should also be an encouraging sign. It will be some time until the data will reveal whether the observed effects in Portugal can be affirmatively attributed to decriminalization and whether they represent short- or long-term effects; certainly, though, decriminalization is no easy solution to the harms associated with the black market trade in drugs.

Conclusion

Drug prohibition has long been a point of contention among economists and policy makers, with those supporting the liberalization of drug policies arguing that the harms associated with a large underground economy outweigh the potential harms of the greater availability of currently illicit drugs. Unfortunately, there have been few opportunities to empirically study the effects of the liberalization of drug policies, meaning the debate has been largely theoretical, and at least with regard to decriminalization, the economic theory is largely ambiguous. As prohibitionist policies continue to fail to eradicate the drug problem and violence related to the illegal distribution of drugs grows, especially in drug-producing countries such as Mexico, the liberalization of drug policy is gaining traction in the public discourse both in the United States and abroad. This paper examined Portugal's experience with the decriminalization of all drugs, which began in 2001, finding a positive correlation in the Portuguese case between

decriminalization and homicide and drug mortality rates relative to other European Union countries.

In the literature review section, this paper considered both theoretical and empirical work surrounding the issue of drug control. Most of the theoretical literature suggests that drug prohibition, by forcing the market for drugs underground, is likely to lead to increased negative externalities associated with the drug market, most notably an increase in violence as economic agents resolve business disputes outside of judicial means. While the theory gives a clear basis for moving away from a prohibition framework, it sheds little light on what effects decriminalization, by liberalizing only the demand side of the illicit drug market, might have on such externalities. Jeffrey Miron and others explain some scenarios in which user sanctions might result in disputes unrelated to the drug trade being resolved with violence, but it is unclear from the theory how the magnitude of these effects might compare to the increase in drug use one would expect from reduced user penalties. The empirical literature up to this point has primarily used supply-side variables as proxies for levels of drug enforcement; while these studies have found that drug enforcement increases homicide rates, they do not speak to the possible effects of decriminalization as such. Problems with data availability have limited the extent to which economists have been able to examine previous experiments with decriminalization, although MacCoun does find that drug mortality rates increased during Italian decriminalization.

This paper used a difference in differences model to analyze the effect of Portuguese decriminalization on homicide and drug mortality rates relative to Spain, Italy, France, the United Kingdom, Germany, and Sweden. Annual homicide and drug mortality data for the period from 1994 to 2008 obtained from Eurostat were used for the analysis. The estimated

coefficients for the effect of decriminalization in Portugal on the natural logarithm of homicide and drug mortality rates were both positive. Decriminalization was found to be associated with an approximately 25% increase in homicide rates and an increase of over 150% in drug mortality rates. Standard errors were computed with the Newey-West method. While the coefficients appear to be statistically significant based on the estimated standard errors, autocorrelation within countries may render the estimated standard errors invalid, and there are also problems related to the reporting of drug mortalities which make this particular coefficient suspect. While statistical inference based on these results is not possible, they do suggest decriminalization was associated with at least a short-term increase in homicide and drug mortality rates in Portugal. In the Portuguese case, decriminalization does not seem to have remedied the problems of drug prohibition; on the contrary, it may have in fact led to an increase in the negative externalities associated with the illicit drug market.

The results of this analysis do not imply a causal connection between decriminalization and increased homicide and drug mortality rates, generally or even for Portugal alone, but they should encourage economists to consider decriminalization more carefully. Economists who oppose drug prohibition may be inclined to favor decriminalization as simply a "less bad" alternative, but there are both theoretical reasons and (limited) empirical evidence which suggest that liberalization of only the demand side of the drug market may cause more harm than good. While the legalization of drugs is at present politically untenable (at least outside of the areas most adversely affected by the international drug trade, such as Latin America), it may be time economists started discussing it as a more theoretically justifiable alternative to prohibition than decriminalization.

This paper, rather than being interpreted as evidence that decriminalization does not work, should highlight the necessity for further research and for caution when liberalizing drug policies. Just because drug prohibition is problematic does not necessarily mean that decriminalization will lead to an immediate improvement of the situation. The liberalization of drug policies should be considered carefully, with an eye towards both the theory and the available empirical data. If subsequent research does show that decriminalization does not address the problems of drug prohibition, economists and policy makers may have to come to terms with making the uncomfortable decision between prohibition and the full legalization of drugs.

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