*The Impact of Drug Decriminalization in Portugal**

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Abstract

This paper aims at investigating the impact of drug decriminalization in Portugal using the Synthetic Control Method. The applied econometric methodology compares Portuguese drug-related variables with the ones extracted from a convex combination of similar European countries. The results suggest that the policy change contributed to a decrease in the number of heroine and cocaine seizures, a decrease in the number of offenses and drug-related deaths, and a decrease in the number of clients entering treatment.

Keywords: illicit drugs, policy, decriminalization, synthetic control method.

*We benefit greatly benefit from the a very enlightening conversation with João Goulão, head of the Instituto para a Droga e Toxicodependência**.**

"The evidence from Portugal since 2001 is that decriminalisation of drug use and possession has benefits and no harmful side-effects"

The Economist, August, 2009

"In most respects, the law seems to have worked: serious drug use is down significantly, particularly among young people; the burden on the criminal-justice system has eased; the number of people seeking treatment has grown; and the rates of drug-related deaths and cases of infectious diseases have fallen."

The New Yorker, October, 2011

1. Introduction

The economics of illicit drugs is, according to Van Ours and Pudney (2006), the area where the distance between economic research and economic policy is perhaps the greatest. The major reason for this lies in the lack of reliable data inherent in the illegal nature of drugs. Still, economists' contribution is precious in order to bring an evidence-based analysis to the discussion. In particular, economic concepts and analytical tools can be very useful in terms of policy design as this paper demonstrates by evaluating the impact of drug decriminalization in Portugal.

On the 22nd of April 1999, the Council of Ministers approved the National Strategy for Fight against Drugs, which delineated 13 strategic options in accordance to its core values and objectives, one of them being the decriminalization of consumption, possession and

purchase of illicit drugs for personal consumption. The decriminalization law itself was then approved by the Parliament on 29 November 2000 according to law number 30/2000 and was implemented on 1 July 2001. It states that use, purchase and possession for use of any illicit drugs (hard or soft), in public or in private, not exceeding the average quantity required for 10 days of individual consumption is no longer to be considered a criminal offense, but rather an administrative one. Any amount greater than this is considered drug trafficking and continues to be prosecuted as a criminal offense.

Portugal is the only EU member state so far that has dared to explicitly declare the decriminalization of drug usage. In the other states a less liberal legal framework is predominant: either it is criminalized or, as in most countries, it has been depenalized, particularly for personal cannabis use. Nevertheless, legalization is far beyond the scope of any country's discussion.

It is essential to distinguish depenalization from decriminalization. In plain words, depenalization comprises a criminal offense but no penal sanctions (imprisonment cannot be imposed), whereas decriminalization means a certain conduct is prohibited but sanctions do not fall within criminal law.

Along with the legal change, the overall attitude towards the Portuguese drug problem has shifted from a punitive approach to a comprehensive public health-oriented approach, where prevention and treatment are core concerns. Offenders are now sent to "Commissions for Dissuasion of Drug Addiction" responsible for adjudicating administrative drug offenses and imposing sanctions (fines and others). Legal proceedings are temporarily suspended if the offender has no previous record of drug offense and is considered non-addict or, alternatively, if the offender is a drug addict but agrees to undergo treatment. Clearly the orientation of the commissions is to encourage dependent

drug users to pursue treatment and not to punish their behaviour, which previously was very stigmatized and contributed for their fear of seeking help.

The current paper aims at studying the impact of this policy change in Portugal, using a novel econometric estimation methodology called the Synthetic Control Method, proposed by Abadie and Gardeazabal (2003). Even though the effect of such a policy can only be observed in the long-run, it is possible to perform a meaningful analysis after 9 years of the implementation.

We begin with a brief literature review on the subject, which will be followed by a careful explanation of the methodology. Section 4 describes the dataset and section 5 is devoted to the estimation and inference. In the conclusion the main empirical results are summarized.

2. Literature Review

Most studies on illicit drugs concern the demand side of the market because the difficulty in collecting reliable data is even greater when it comes to the supply side and the market structure. One of the main contributions of economic analysis of behaviour on the demand side is the Becker-Murphy (1988) theory of rational addiction, which states that behaviour is the result of intertemporal choices, where the addictiveness of goods contributes to a higher effect of past consumption on current consumption. In fact, the addictiveness and illegality associated with illicit drugs is what makes this area of study so interesting. It forces the economist to departure from conventional economic theories of behaviour and standard market dynamics, and to develop new models. Policy design in particular needs urgent contribution from the economists since it is usually the responsibility of the law and health authorities who lack rigorous analytical tools and economic intuition. But let me

summarize what the literature has covered so far on drug policy matters, namely regarding the discussion about the effects of decriminalization.

International evidence does not suggest a clear-cut impact of drug policy on the prevalence of drug use. It is unknown whether drug criminalization or decriminalization policies contribute to lower drug usage rates. However, according to Mazerolle at al. (2006), enforcement of drug laws may have effects in reducing the harm associated with drug markets. Thus, drug policy is far from being irrelevant.

Reinarman at al. (2004) sought to determine the relevance of policy concerning cannabis. They compared experienced cannabis users in two cities with opposing policies: Amsterdam (where it is decriminalized) and San Francisco (where it is criminalized), and they found no evidence that either decriminalization increases cannabis use or that criminalization decreases cannabis use.

Also in Italy, where drug policy has changed its degree of tolerance several times since 1975, the trend of drug use is increasing, apparently non-responsive to legislation (Solivetti 2001).

MacCoun and Reuter (1997, 2001) analyse the evidence on marijuana decriminalization in the United States, Australia and the Netherlands. They find no evidence that higher marijuana use is associated with decriminalization. Still, regarding the Netherlands, they do conclude that the commercialization of cannabis has contributed to an increase in use.

A study about the UK drug policy ceases to reach a satisfying conclusion either and it refers to the importance of social and cultural factors. Furthermore, it registers higher rates of overall and problematic drug use than both Sweden and the Netherlands, which have two totally contrasting approaches towards drug policy (Reuters and Stevens, 2007).

Regarding the Portuguese case, Greenwald (2009) conducted an extensive report concluding that drug decriminalization has caused no harm and, if anything, it has

improved the situation. Indeed, empirical data shows lower lifetime prevalence rates in the post-decriminalization period for almost every category of drug and for several age groups. Moreover Greenwald refers to the declining trends for drug-related pathologies, namely the number of deaths due to drug usage and the number of drug users among newly infected HIV-positive individuals.

A report by Hughes and Stevens (2007) mentions the decrease of the burden on the criminal justice system as an advantage of drug decriminalization in Portugal. Not punishing drug possession as a penal sanction lowered significantly the costs of having police officers, lawyers and courts dealing with these issues as well as the costs of imprisoning drug offenders. However, while judicial costs decreased, other costs associated with treatment and prevention increased. The new heath-based approach basically changed the allocation of public expenditure to drug issues, which were directed to the creation of the system of referral to the "Commissions for Dissuasion of Drug Addiction", to the construction of new treatment facilities and to prevention campaigns among others.

3. Methodology

What the literature on drug policy effects has covered so far is based on careful comparative case studies. Researchers compare the outcome of relevant variables before and after a certain reform is implemented in a country and then extend the comparison to other countries with similar characteristics. The problem with this kind of approach is the lack of accuracy. The data can easily be contaminated by other factors like the natural trends of the outcome variables, the interaction with other policies, the social and economic performance of the country, etc.

The aim of this paper is to disentangle the effect of the decriminalization of drugs in Portugal using the Synthetic Control Method (SCM) for comparative case studies. This

method was developed by Abadie and Gardeazabal (2003) to investigate the economic cost of conflict using the Basque country as a case study, and it was further extended by Abadie, Diamond and Hainmueller (2009) in order to estimate the effect of Proposition 99, California's tobacco control program. The advantage of this method is to allow for the impact of unobservable country heterogeneity to vary with time, whereas the usual difference-in-difference (fixed effects) estimation does not.

In this study, the SCM will tell us with a reasonable degree of certainty whether decriminalizing drugs in Portugal had a significant impact in a number of outcome variables. First, we construct what is called a synthetic control region: a weighted combination of European countries that best resembles the Portuguese characteristics before the implementation of drug decriminalization in 2001. Then, we compare the verified outcomes of the relevant variables in Portugal in the post-decriminalization period with the ones that would have been observed in the artificial Portugal where no intervention has occurred. Finally, the difference between the two outcome trends will reveal the true impact of the policy change.

A formal description of the method is presented in the following model.[1] Suppose we have information about $(J+1)$ countries: the J stands for the "donor pool", all the potential control countries, and the 1 refers to the treatment unit. The dataset comprehends T periods and the intervention occurs at period T_0 $(1 \le T_0 < T)$.

Let Y_{it}^N be the outcome variable of interest for country i in period t in the absence of the policy intervention and Y_{it}^I the corresponding value for the treated country during the implementation period $[T_0+1, T]$. Assuming that the intervention has no effect on the outcome before the implementation period $(Y_{it}^I = Y_{it}^N)$, which implicitly assumes that an

intervention implemented in the treated country has no effect on the outcomes of the untreated countries, we can define $\alpha_{it} = Y_{it}^{I} - Y_{it}^{N}$ as the effect of the intervention for country i in period t.

Therefore, the observed outcome Y_{it} for country i in period t can be expressed as:

$$Y_{it} = Y_{it}^{N} + \alpha_{it} D_{it}, \text{ with } D_{it} = \begin{cases} 1 & ,if\ i = 1 \quad and \quad t > T_0 \\ 0 & ,otherwise \end{cases}.$$

If $i = 1$ is our treatment unit, we want to estimate: $\alpha_{1t} = Y_{1t}^{I} - Y_{it}^{N}$. Y_{1t}^{I} is observed , so we just need to estimate Y_{it}^{N}. This is specified by the following factor model:

$$Y_{it}^{N} = \delta_t + \theta_t Z_i + \lambda_t \mu_i + \varepsilon_{it},$$

where δ_t is an unknown common factor with constant factor loadings on all countries; θ_t is a $(1 \times r)$ vector of unknown parameters; Z_i is a $(r \times 1)$ vector of observed covariates; λ_t is a $(1 \times F)$ vector of unobserved common factors; μ_i is a $(F \times 1)$ vector of unknown factor loadings; and the error terms are the unobserved transitory shocks at the country level with zero mean.

The proposed estimator of α_{it} is $\hat{\alpha}_{it} = Y_{1t} - \sum_{j=2}^{J+1} w_j^{*} Y_{it}$, for $t \in \{T_0 + 1, ..., T\}$ where w_j^{*} denotes the optimal weight of unit j, and the counterfactual situation for the treated country in the post-treatment period is a linear combination of the outcomes of the potential controls: $\hat{Y}_{1t}^{N} = \sum_{j=2}^{J+1} w_j^{*} Y_{jt}$.

The estimator $\hat{Y}_{1t}^{N}$ is unbiased if w^{*} is chosen to minimize the distance between X_1 and X_0:

[1] Here we closely follow the description provided by Abadie, Diamond and Hainmueller (2009).

$$Min \| X_1 - X_0 W \| v = \sqrt{(X_1 - X_0 W)' V (X_1 - X_0 W)}$$
$$w$$
$$s.to: \begin{cases} w_2 \geq 0, ..., w_{J+1} \geq 0 \\ w_2 + ... + w_{J+1} = 1 \end{cases}$$

where:

$X_1 = (Z_1^{'}, \overline{Y}_1^{K_1}, ..., \overline{Y}_1^{K_M})'$ is a $(k \times 1)$ vector of pre-treatment characteristics of the exposed country;

X_0 is a $(k \times J)$ matrix of pre-treatment characteristics of the unexposed countries, where the j^{th} column is just $(Z_j^{'}, \overline{Y}_j^{K_1}, ..., \overline{Y}_j^{K_M})'$ and $j = 2, ..., J+1$;

$K_1, ..., K_M$ are $(T_0 \times 1)$ vectors corresponding to M linear combinations of pre-treatment outcomes;

$$\sum_{j=2}^{J+1} w_j^* \overline{Y}_j^{K_1} = \overline{Y}_1^{K_1}, ..., \sum_{j=2}^{J+1} w_j^* \overline{Y}_j^{K_M} = \overline{Y}_1^{K_M};$$

$$\sum_{j=2}^{J+1} w_j^* Z_j = Z_1;$$

$W = (w_2, ..., w_{J+1})$ is a $(J \times 1)$ vector corresponding to the weights attributed to each of the untreated countries and respecting the constraints of the optimization problem (nonnegative and summing up to 1);

V is a $(k \times k)$ diagonal and positive semi-definite matrix reflecting the relative importance of each of the K variables.

Because the discrepancy between Y_{1t}^I and Y_{it}^N might solely be a result of chance or of the inability of the method, a "placebo study" or "falsification test" is performed in the end. It consists in iteratively running the SCM to each and every country in the donor pool where no decriminalization was implemented. After placing Portugal in the donor pool,

each country at the time is selected to become a false treatment country and the SCM will determine the impact of the Portuguese drug policy in each of the countries. If on average this impact is greater in Portugal than in the majority of the control countries we can tell with some degree of certainty that the decriminalization of drugs in Portugal did in fact had some impact on the outcome under study. This placebo study is essential to infer about the significance of the estimates.

Now, after having presented this general model, we just have to apply it to our case study where the treatment unit is Portugal and the treatment period is 2001.

4. Data

Data was collected for 30 European countries: the 27 EU member states plus Croatia, Turkey and Norway. The time period under analysis goes from 1990 to 2008, covering 11 years of pre-treatment data and 7 years of post-treatment data. Due to the lack of data regarding outcomes on drugs many constraints were faced when constructing this database. Namely, some countries and years had to be dropped out from the panel, since there can be no missing observations for the outcome under study for any of the control countries.[2]

We studied the impact of the decriminalization on several outcome variables: seizures of heroin and cocaine (two of the most common and harmful drugs in the market), drug-law offenses, drug-related deaths and treatment demand. The choice of these outcomes was largely based on the availability of harmonized data across the countries and we tried to cover different branches of the problem. We also attempted to study the impact of decriminalization on the prevalence of AIDS among injecting drug users, but unfortunately the SCM was not able to deliver a reasonable fit: no convex combination of countries could

[2] The following 10 countries were never used: Cyprus, Czech Republic, Estonia, Latvia, Lithuania, Malta, Romania, Slovakia, Croatia and Turkey.

resemble Portugal well enough in the pre-treatment period. Thus, no valid inference could be drawn from the achieved results.

As for the predictors, the following were considered: GDP, unemployment rate, a civil liberties indicator[3], the proportion of young population (aged 15 to 24), the retail prices of opiates and cocaine, alcohol consumption and tobacco prevalence. The first two predictors characterize the economic situation of the country; the third refers to social freedom; the fourth is to account for the fact that the drug problem occurs in larger scale among the youth; the prices of drugs is a market indicator of the interaction between demand and supply; and finally alcohol and tobacco characterizes the social habits that are more often related to drug environments. Additionally, we included in the list of predictors of each outcome variable the mean of the outcome itself across the potential controls for each two years of the pre-treatment period. This allows for a better fit of the synthetic control country.

A detailed explanation of all the variables as well as their respective sources is available in appendix A.

5. Estimation

In this section we present the empirical results of the study, analysing each outcome separately. The tables and figures mentioned here can be found in appendix B.

- **Heroin and cocaine seizures**

For both the number of heroin seizures and the number of cocaine seizures, 11 countries were used as potential controls for the period ranging from 1990 to 2007. A number of

[3] Based on surveys and involving: freedom of expression and believe, association and organization rights, Rule of Law, and personal autonomy and individual rights.

countries were not considered due to lack of information. The composition of the donor pool and the respective weights attributed to each control country is shown in table 1.

After having constructed the synthetic Portugal, one can visualize the trends of the number of seizures for Portugal and its synthetic counterpart. Figure 1 displays the trends of the number of heroin seizures, while figure 3 refers to cocaine. We see that in the pre-treatment period, the dotted line representing synthetic Portugal is very close to the one describing the true Portuguese trend. This goodness of fit is also represented in table 2 where we can see how close the predictor values are among each other. They compare the characteristics of Portugal and synthetic Portugal for the period previous to 2001, the period for which the difference between the predictor means was to be minimized. The last row of the table indicates the Root Mean Squared Prediction Error (RMSPE): a measure of the goodness of fit aimed to be as small as possible.

[Insert Figures 1 and 3 about here]

The impact of the decriminalization of drugs is given by the estimated difference between the line representing Portugal and its synthetic counterpart in the period after the implementation of the policy. In figure 1 we see a sharp decline in the number of heroin seizures registered in Portugal after 2001 and the discrepancy between the lines suggests that this decline would have been much less accentuated in the absence of a policy. In figure 3 we observe a very modest increase in the number of cocaine seizures verified in Portugal and the dotted line suggests that this increase would have been a sharp one if no decriminalization had occurred. The results show that the decriminalization had a substantial negative impact on the number of both heroin and cocaine seizures. Note that the actual Portuguese trends for both drugs start declining in the year of 1999 (not 2001), which might be an anticipation effect arising from the adoption of the new National Strategy for Fight against Drugs in 1999. As the approach towards the drug problem

shifted from a punitive one to a health-directed one, police enforcement might have directed its focus of action to the supply side. Instead of seizing small quantities from lots of consumers, police might have preferred to tackle the base of the problem by seizing large quantities from the big dealers.

In order to access the significance of the results suggesting a negative impact of the decriminalization in the number of seizures, we need to perform the placebo tests. Figures 2 and 4 display the estimated gaps in the number of heroin and cocaine seizures, respectively, between Portugal as well as all the other false treatment countries and each respective synthetic counterpart. What we want is to have most of the gray lines to have higher gaps than the line in bold referring to Portugal in the post-treatment period. As we may see, the graphs show that our initial results are not very robust in the case of heroin, but are indicative of a significant effect for cocaine.

[Insert Figures 2 and 4 about here]

- **Drug law offenses**

The study of the impact of drug decriminalization on the number of drug law offenses revealed that the policy was beneficial to the Portuguese drug situation.

Due to data constraints the donor pool of this outcome is composed by 12 countries, with their assigned weights represented in table 1, covering a time horizon of 17 years: from 1991 to 2007.

Figure 5 depicts the trend for the drug-law offenses observed in Portugal and in the synthetic Portugal. The small gap between the two lines in the pre-intervention period indicates that the convex combination of the 5 countries assigned with a positive weight in the synthetic region is a good approximation of Portugal itself before 2001. Moreover, the mean values of the predictors of this outcome presented in table 2 show this resemblance.

[Insert Figure 5 about here]

The discrepancy between the lines in the period following the decriminalization tells us that the policy had a negative impact on the number of drug-law offenses. Naturally this conclusion is solely valid under the assumption that the level of efficiency of the police force is more or less the same throughout the countries and through time.

The placebo study exhibited in figure 6 supports the robustness of the result. Indeed, the estimated effect for Portugal is quite large relative to the effect for a country chosen at random from the pool.

[Insert Figure 6 about here]

- **Drug-related deaths**

The estimation suggests that decriminalization contributed to a decrease in the number of drug-related deaths.

The donor pool is a selection of 14 countries for which there are no missing observations of the outcome variable. Norway stands out in the pool with a weight of 61% as we can see in table 1.

The SCM was run for a time horizon from 1990 to 2006 and, for the period previous to 2001, table 2 shows the similarity between Portugal and its synthetic counterpart. In the post-treatment period, the dotted line (depicted in figure 7) representing synthetic Portugal follows a path above the Portuguese one, but yet decreasing. This means that in the absence of the decriminalization there would have been a higher number of drug-related deaths. However, one has to be careful when analysing the Portuguese trend because the Portuguese definition of drug-related deaths is broader than that of most European countries: it contemplates all autopsies testing positive for toxicological examinations, while for most European countries national definitions are stricter accounting only for

overdoses. This weak uniformity represents a major drawback for this comparative case study since it may overestimate the number of deaths in Portugal that is directly connected with drugs.

[Insert Figures 7 and 8 about here]

The placebo tests that were performed to the control countries seem to validate the estimated impact of the policy (see figure 8).

- **New clients entering treatment**

Unfortunately, for this outcome variable the dataset is relatively short. Since there is very few data regarding treatment units, the donor pool is composed solely by 7 countries and the time horizon goes from 1996 to 2008, being restricted to a pre-intervention period of 5 years.

The weight distribution among the control countries is presented in table 1 and the predictor balance is presented in table 2. Despite the size of the dataset, the goodness of fit provided by the SCM was quite satisfactory.

The Portuguese trend in figure 9 shows a declining trend in the number of clients entering treatment from 1999 till 2006. Only in the two subsequent years did the country register an increase in this number. The decline is surprising since the new course of thinking defined by the new National Strategy for Fight against Drugs is more health-oriented and focused on treatment improvement. However, one has to understand the strategy involved. In a first stage, it aimed at enhancing the proximity to drug addicts through treatment and prevention campaigns in the streets and in a subsequent phase encouraging drug addicts to undergo treatment in the treatment centres. The ultimate objective is to include drug addicts in treatment programs which include social and psycho-intervention, and not only promoting harm-reduction programs in the areas of substitution

by methadone and sanitary intervention. Therefore, in the future, the number of clients entering treatment centres is expected to increase as possibly suggested by the trend in 2007 and 2008.

[Insert Figures 9 and 10 about here]

The placebo study in figure 10 concludes that the result is not drawn by chance but rather the decriminalization had an impact on the number of clients entering treatment centres.

6. Conclusion

This paper is a contribution of economic analysis to the area of illicit drugs' policy design. It investigates the effect of the decriminalization law in Portugal on some drug-related outcomes using the Synthetic Control Method for comparative case studies of Abadie and Gardeazabal (2003). The results suggest that drug decriminalization contributed to a decrease in the number of seizures of hard drugs, namely heroine and cocaine, which is an indirect indication of drug supply reduction in Portugal. Moreover, the results associate the policy change with a decrease in both the number of drug-law offenses and the number of drug-related deaths. Another finding concerns treatment demand: drug decriminalization had a negative impact in the number of clients entering treatment. This is a bit unexpected knowing that one of the objectives of the reform was to improve public health through extended access to treatment and better treatment facilities. Hence the result can be explained by one of two reasons: either the policy objectives were not met in this area or the effects of the policy are yet to come. Given that the number of clients entering treatment is rising since 2007, the second reason is more likely to be closer to the truth.

All in all, policy makers should not fear the consequences of rethinking their attitude towards the drug problem. Decriminalization might actually be a good solution for

countries with characteristics similar to Portugal. Moreover, if European countries harmonize their policies we would definitely observe a stronger international cooperation on this matter.

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Appendix A: Data Sources and Description

Variable	Source	Description
Heroin seizures	EMCDDA	Number of heroin seizures by law enforcement agencies, mainly police, costums officials and national guard. The numbers of seizures are usually considered as a better indicator of trends than the quantities seized because the latter may fluctuate from one year to another due to a small number of large seizures. Note that the variable is affected by differences in police practices.
Cocaine seizures	EMCDDA	Same as above, but concerning cocaine.
Drug law offenses	EMCDDA	Number of reports of drug law offenses, including drug use and possession for use, production, trafficking and dealing. It reflects differences in legislation and law enforcement.
Drug-related deaths	EMCDDA	Number of acute drug-related deaths recorded in EU Member States according to national definitions.
New clients entering treatment	EMCDDA	Number of clients entering a treatment centre for the first time in their lifes.
Gross Domestic Product per capita	OECD (national accounts data files)	Constant 2005 US dollars.
Civil Liberties Indicator	Freedomhouse.org	Rating of civil liberties between 1 (most free) to 7 (least free). It reflects an overall judgment based on survey results, involving questions grouped into four subcategories: freedom of expression and believe; associational and organizational rights; Rule of Law; and personal autonomy and individual rights.
Unemployment rate	ILO	Total unemployment as a percentage of total labour force.
Proportion of youth	EUROSTAT	Proportion of population aged between 15 and 24 years old.
Price of opiates	UN world drug report 2009	Retail price (street price) of opiates, US$/gram.
Price of cocaine	UN world drug report 2009	Retail price (street price) of cocaine, US$/gram.
Alcohol consumption	OECD Health Data	Liters consumed per capita by people aged above 15 years old.
Tobacco consumption	OECD Health Data	Percentage of population above 15 years old who are daily smokers.

Note: EMCDDA stands for European Monitoring Centre for Drugs and Drugs Addiction. It is responsible for collecting country data on drugs from all European countries. National drug monitoring centres report to this agency which organizes the information in an harmonized manner passive to be comparable at the European level. This decentralized EU agency was formally established in 1993 and is based in Lisbon since 1995.

Appendix B: Results

Table 1: Weight distribution in the donor pool for each outcome.

Control country	Heroin seizures	Cocaine seizures
Austria	0,037	0,632
Belgium	0	0,013
Denmark	0	0
France	0	0
Germany	0	0
Ireland	0,072	0
Luxembourg	0	0
Spain	0,504	0,118
Sweden	0,387	0
UK	0	0,237
Norway	0	0

Control country	Drug-law offenses
Austria	0
Belgium	0
Denmark	0,121
Finland	0
France	0
Germany	0,091
Hungary	0
Ireland	0
Poland	0,109
Slovenia	0,227
Sweden	0,451
UK	0

Control country	Drug-related deaths
Austria	0
Bulgaria	0
Denmark	0
Finland	0
France	0
Germany	0
Greece	0,208
Luxembourg	0
Netherlands	0
Poland	0,119
Spain	0
Sweden	0
UK	0,063
Norway	0,61

Control country	New clients entering treatment
Austria	0,128
Denmark	0
Germany	0
Greece	0
Ireland	0,11
Italy	0,554
Netherlands	0,208

Table 2. Predictors' balance for each outcome variable

Outcome: heroin seizures	treated	synthetic
log_gdp	9.565	10.117
log_fiwcl	0.063	0.263
unemployment	5.472	13.415
age15to24	15.845	14.773
log_opprice	4.158	4.952
alcohol	14.236	9.853
tobacco	20.05	28.265
log_her(1990)	7.205	7.287
log_her(1992)	7.758	7.664
log_her(1994)	7.663	7.839
log_her(1996)	8.239	8.118
log_her(1998)	8.229	8.292
log_her(2000)	8.071	8.115
RMSPE		0.087

Outcome: cocaine seizures	treated	synthetic
log_gdp	9.545	10.247
log_fiwcl	0.063	0.229
unemployment	5.473	6.973
age15to24	15.845	13.42
log_cocprice	4.046	4.771
alcohol	14.236	12.757
tobacco	20.05	26.264
log_coc(1990)	5.846	5.85
log_coc(1992)	6.33	6.235
log_coc(1994)	6.345	6.552
log_coc(1996)	7.058	6.997
log_coc(1998)	7.227	7.206
log_coc(2000)	7.074	7.286
RMSPE		0.129

Outcome: drug-law offenses	treated	synthetic
log_gdp	9.565	10.071
log_fiwcl	0	0.305
unemployment	5.55	8.298
age15to24	15.81	13.767
log_offenses(1992)	8.745	8.483
log_offenses(1994)	8.457	8.696
log_offenses(1996)	9.111	8.993
log_offenses(1998)	9.341	9.363
log_offenses(2000)	9.566	9.535
RMSPE		0.135

Outcome: drug-related deaths	treated	synthetic
log_gdp	9.565	10.207
log_fiwcl	0.063	0.332
age15to24	15.845	13.726
unemployment	5.473	6.837
log_deaths(1990)	4.407	4.552
log_deaths(1992)	5.05	4.868
log_deaths(1994)	4.96	5.098
log_deaths(1996)	5.447	5.464
log_deaths(1998)	5.82	5.732
log_deaths(2000)	5.762	5.976
RMSPE		0.129

Outcome: Clients entering treatment	treated	synthetic
log_gdp	9.556	10.195
log_fiwcl	0	0.384
unemployment	5.5	8.943
age15to24	15.36	13.118
log_opprice	3.99	4.436
log_cocprice	3.984	4.41
alcohol	13.16	10.311
tobacco	20.05	27.831
log_treatm(1996)	9.2	9.198
log_treatm(1998)	9.098	9.13
log_treatm(2000)	9.165	9.161
RMSPE		0.016

Fig 1. Trends in heroin seizures: Portugal vs. synthetic Portugal.

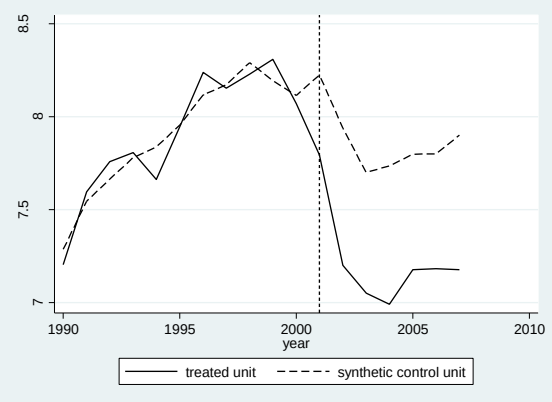

Fig 2. Heroin seizures gaps in Portugal and placebo gaps.

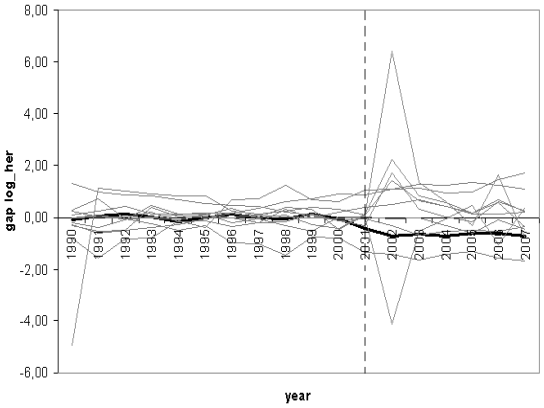

Fig 3. Trends in cocaine seizures: Portugal vs. synthetic Portugal.

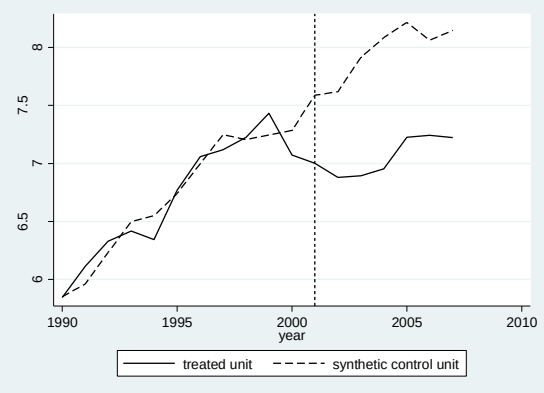

Fig 4. Cocaine seizures gaps in Portugal and placebo gaps.

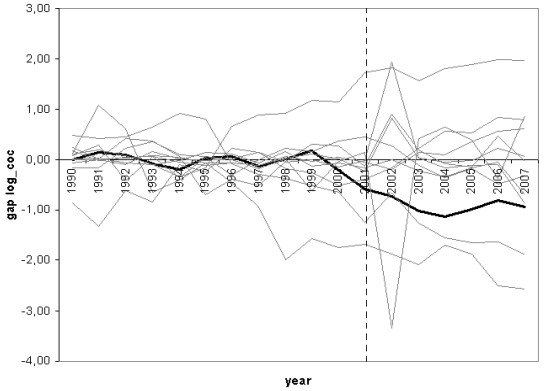

Fig 5. Trends in drug-law offenses: Portugal vs. synthetic Portugal.

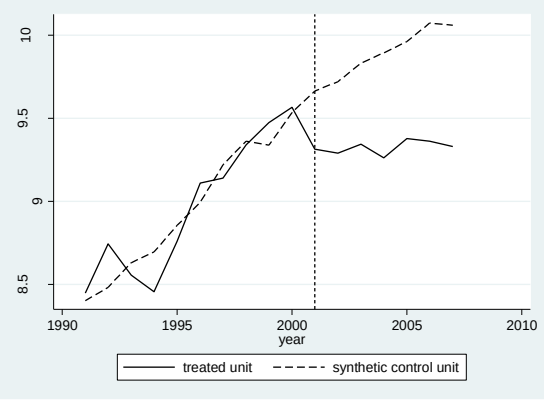

Fig 6. Drug-law offenses gaps in Portugal and placebo gaps.

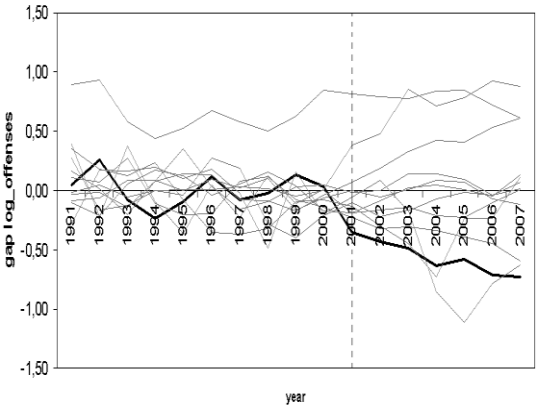

Fig 7. Trends in drug-related deaths: Portugal vs. synthetic Portugal.

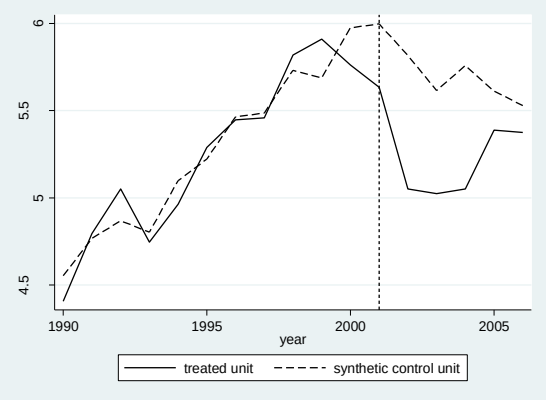

Fig 8. Drug-related deaths gaps in Portugal and placebo gaps.

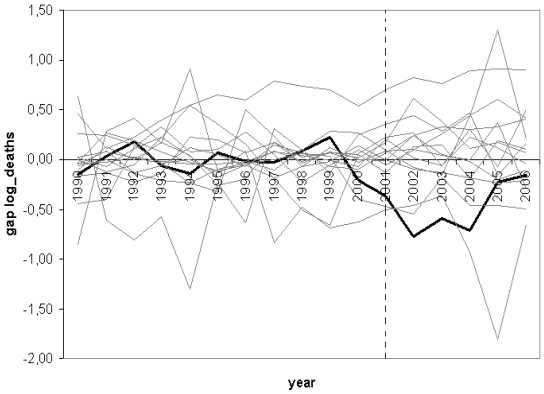

Fig 9. Trends in new clients entering treatment: Portugal vs. synthetic Portugal.

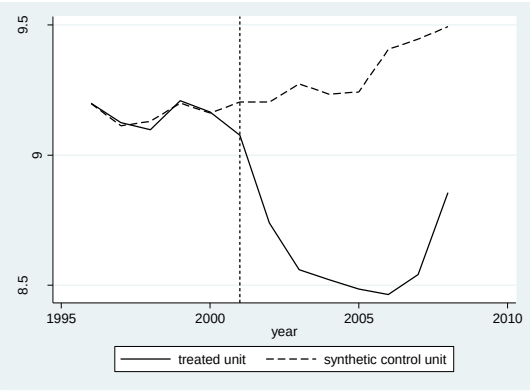

Fig 10. New clients entering treatment gaps in Portugal and placebo gaps.