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Impact of depenalization on drugs deaths in England and Wales. An instrumental variable approach.

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Abstract

This article investigates the role of drug depenalization on drug related deaths in England and Wales. We use an instrumental variable approach, based on Police and Crime Commissioners elections and voters' left-wing preferences in the area. The first stage findings indicate that to an increase in voters left-wing preferences corresponds a decrease in drug-related arrests. The IV results indicate that a decrease in our instrumented variables generates an increase in deaths related to drug poisoning/drug misuse. Specifically, to a decrease of 1% in our instrumented variables corresponds to an increase between 0.04% and 0.07% in the drug poisoning/misuse deaths ratio. We replicate our analysis using different definitions of political preferences, lag specifications, dependent and independent variables and the findings are similar.

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1 Introduction

In the last decade, many European country experience a sharp increase in drug-related deaths. The United Kingdom is no exception. According to the "*European Drug Report 2020*", in 2017 in the UK 76.2 persons per million died in drug induced deaths, the second highest result after Sweden (81 deaths per million).[1] The situation is worst for Scotland, with 295 deaths per million. However, the results for England and Wales are not rosy, with 4393 drug-related deaths in 2019 (76.7 deaths per million people), the highest number since records began in 1993.[2]

Given the high number of drug-related deaths, the academic and political debate is focused on how to solve this "national tragedy and disgrace", as called by David Liddell, Chief Executive of Scottish Drug Forum.[3] Part of the discussion revolves around police and governments' behaviours towards drug and how a change in their approach can decrease the number of drug-related deaths. In this article, we examine impact of variations in drug arrests towards drug-related deaths in England and Wales. However, studying the relationship between drug-related deaths and drug arrests is not always straightforward due to endogeneity issues. To ensure the causal interpretation, we implement an instrumental variables approach using introduction of elected Police and Crime Commissioners (PCCs). According to the previous literature, police force areas with left-wing PCCs or with more left-wing voters are more lenient regard to drug charges with respect to police force areas with right-wing PCCs or with more right-wing voters (e.g. Nowacki and Thompson (2021)). The first stage results indicate that to an increase in the strength of the left-wing parties corresponds a decrease in drug related arrests and the IV findings indicate that to a decrease in our instrumented variables corresponds an increase in drug related deaths. In more details, to an increase of 1% in left wing voting corresponds a decrease between 7% and 15% in drug arrests ratio and to a decrease of 1% in our instrumented variables corresponds an increase between 0.04% and 0.07% of death ratios. The results are robust to variations in our definitions of drug deaths and left-wing political preferences.

1.1 Literature

The previous literature categorizes drug policies in three main areas: prevention, enforcement and treatment (Grossman et al., 2002). In this article, we focus on the effects of the variation in law enforcement intensities which can be of two types: an increase or a decrease in policing and arrests. An example of the first approach is the *War on drugs* in the US in the 90s, with strong policing, with by arrests for drug possession even for small drug quantities. Eck and Maguire, 2000 investigate the role of aggressive policing on crime drop in the US. According to the authors, the police had an impact on drug, possibility though the drug market, but the decrease in crime and drug use cannot entirely be attributed to harsher policing. Another example of harsher policing approaches is Dobkin and Nicosia, 2009, where the authors investigate the role of the DEA on disrupting the supply of methamphetamine precursors.[4] Their findings suggests that the government was successful in the short run but not in the medium and long runs, with hospital admissions, treatment admissions, and arrests returning to the original levels in eighteen months after the DEA disruption.

The second approach, decrease in law enforcement, can be articulates in three different strategies: legalization, decriminalization and depenalization. According to Hughes and Stevens, 2010, legalization removes the criminal penalties for a certain behaviours, changing their status from legal to illegal. Decriminalization can be defined as the removal of sanctions from the criminal law,

[1] Source: European Drug Report 2020.
[2] Source: Link ONS 1.
[3] Source: Link BBC.
[4] The Drug Enforcement Administration is a United States federal law enforcement agency tasked with combating drug trafficking and distribution within the U.S.(Source: DEA Website)

possibly replacing them with administrative sanctions. Finally, depenalization is the practice of non-prosecution or non-arrest.

The studies about the effects of legalization have mixed findings. They generally focus on the US and cannabis. Livingston et al., 2017 indicate that cannabis' legalization in Colorado lead to a short-time reduction in opioid-related deaths. Similarly, Bachhuber et al., 2014 suggest the presence of a substitution effect between opioid analgesic and medical marijuana. The authors find that US states with medical marijuana law have lower opioid overdose mortality rate. Powell et al., 2018 indicate that the increase in access to medical marijuana can generate a substitution effect of marijuana to more powerful opioids. Finally, Wen et al., 2015 indicate that medical marijuana laws increase the use of marijuana and, in adults, binge drinking.

Articles about the effects of decriminalization are also present in the literature, especially related to the Portuguese case. Portugal in 2001 decriminalizes possession of all drugs, transforming them from criminal to administrative offences. The Portuguese depenalization reform also includes new preventive measures and new treatment policies. Hughes and Stevens, 2010 examine the reform's effect and compare Portugal with Italy and Spain, similar countries with harsher drug policies. The authors find that the policies generate overall positive outcomes with, reduction in opiate-related deaths and infectious diseases. Similarly, R. J. MacCoun, Reuter, et al., 2001 find that the removal of criminal penalties appeared to produce positive but small impacts, for example decreasing the costs of the criminal justice system and the intrusiveness of criminal justice responses to users. However, the removal of criminal penalties alone had little or no impact on the prevalence of drug use or drug-related health harms (Hughes & Stevens, 2010).

Finally, the previous works also examines the role of depenalization. R. MacCoun and Reuter, 2001 investigate the Netherlands' case, where in the 1970s the government depenalizes the possession of small quantities of cannabis. According to the authors, depenalization does not have an impact on cannabis prevalence. More recently, Kelly and Rasul, 2014 examine the role of cannabis' depenalization on drug-related hospital admissions in London. Their results suggest that the depenalization generates an increase in hospitalization admission rates related to drugs. Our work wants to add on this literature and evaluates the role of variations in drug enforcement policies on drug-related deaths.

This article also links drug depenalization in the UK with left-wing politicians and left-wing voting. We rely on the previous literature on this topic and on the position expressed by political parties in their manifestos. For example, Nowacki and Thompson, 2021 suggest that left-leaning districts are more likely to reduce drug arrest share compared to right-leaning districts in England and Wales. Austen, 2016 also pointed out that left-party candidates for Police and Crime Commissioners advocate for more lenient drug policies. This is coherent with the idea of depenalization connected with left-wing political preferences. Finally, recent political manifestos for 2019 General election in UK indicate that different political parties have different opinions and approaches on drug policies. Conservatives are committed to "law and order", proposing, for example, the strengthening of the National Crime Agency.[5] Conversely, the Labour party addresses the problem more as public health issue, rather than a criminal one.[6] The Green party has similar yet more radical position and advocates the "ending [of] the war on drugs" and the regularization of production, import and supply of all drugs.[7] An analogous position is held by the Liberal Democrat party.[8] They advocate for cannabis legalization, the shift in responsibility of drug policies from the Home Office to the Department of Health, and the decriminalization for drugs possession for personal use.[9]

[5] Source: pp 18 and 19 of Conservative Manifesto.
[6] Source: pp 34, 35, 44 and 46 of Labour Manifesto.
[7] Source: pp 66 and 67 of Green Pary Manifesto.
[8] Sources: pp 61, 71, 75 and 83 of Liberal Democrat Party Manifesto.
[9] Other parties are: *Plaid Cymru* (Wales) and the *Brexit Party*. The first one is for a more health focus approach

The remainder of this article is organized in the following way: in Section 2 we describe the institutional framework. In Section 3, Section 3.1, and Section 4 we present our data and the empirical strategy. In Section 5 we describe the results and in Section 7 our conclusions.

2 Institutional framework: PCC elections and UK parties

As mentioned Section 1, to investigate the effect of depenalization, we implement an instrumental variable approach and, as an instrument for arrest, we use local political preferences. However, local political preferences are not always able to influence police practices in the UK. Before 2012, police oversight and accountability depended on police authorities. They were committees of (mostly) appointed officials and the influence of local communities on them was feeble. However, very few were happy with this system. Many politicians and commentators perceived the accountability of police in the UK too low, especially members of the Conservative and Liberal Democrat parties.[10] To increase public accountability of police forces, in 2012 the UK enacted the "Police Reform and Social Responsibility Act 2011". The reform switched the police overseeing responsibility from appointed police authorities to elected Police and Crime Commissioners (PCC) in England and Wales.[11] PCCs duties include: appointing/dismissing Chief Constables, hold Chief Constables accountable, set the police force budgets and set police objectives.[12]

According to the previous literature, elections can be a good instrument to increase accountability (e.g. Besley and Coate, 2003). Moreover, local elections could increase responsiveness and improve the efficiency of police forces (e.g. Caless and Owens, 2016 and Raine and Keasey, 2012). However, not all previous works consider elections suited for the police forces. For example, Canes-Wrone et al., 2001 suggest that police actions are complex to evaluate and this can limit public oversight and the "accountability effects" produced by elections. Moreover, some authors suggest that media coverage could incentive pandering from police commissioners (Jones et al., 2012) and that national politics would overtake the local police agenda of the commissioners (Lister & Rowe, 2015).

The first elections were held in November 2012. Overall, PCCs elections turnouts are very low, both in 2012, only 15%, and in 2016, a slightly better 26.6%. The low turnout is a serious problem, because it reduces the ability of PCCs to represent local community effectively.

3 Data

In this Section, we describe the dataset used to answer our empirical questions. We include information about: drug deaths, overall deaths, arrests, votes in parliamentary elections, votes in the PCCs' elections. Given the particular situation of London, we drop the observations regarding the capital.[13]

Drug deaths represent the most "extreme" results of drug use and abuse. We use data from the UK Office for National Statistics (ONS).[14] Data are collected between 2008-2018 and aggregated

and for reforming the drug laws. The second one is for targeting county lines drug dealers and gangs.

[10] Source: Article The Times.

[11] The reform gives London a special status, with the Mayor exercises PCC functions. In the following years and as a result of the "Cities and Local Government Devolution Act 2016", the exception was expanded to two others police forces areas: Greater Manchester and West Yorkshire. The change took place for the Greater Manchester area in 2017 and in 2021 for West Yorkshire. For this reason, given the time span in my sample, I exclude London but not Greater Manchester and West Yorkshire.

[12] Source: Association of Police and Crime Commissioners.

[13] See note 11.

[14] The data usually are extrapolated from reports called "*Deaths related to drug poisoning in England and Wales*". Source: Link ONS.

at year and at police force area level. We extract two main variables: drug poisoning and drug misuse.[15] The first variable, drug poisoning, includes all deaths involving a broad spectrum of substances, such as controlled and non-controlled drugs, prescription medicines and over-the-counter medications. It also includes deaths from drug abuse and dependence, and complications of drug abuse.[16] The second variable, drug misuse, has a more restrictive definition. A death is considered deaths by drug misuse, if it is a death by drug poisoning and either the underlying cause is drug abuse or drug dependency[17] and/or it involves any of the substances controlled under the Misuse of Drugs Act 1971.

Our dataset also includes information about the overall number of deaths. We use data of the UK Office for National Statistics (ONS).[18] We aggregate the data at year and police force area level.

The dependent variables are based on drug arrests. We construct these variables using the information about drug criminal offences provided by the UK Home Office.[19] We aggregate the data at year and police force area level.

Finally, we include data about political preferences, specifically votes. We construct our dataset using two different sources for local political preferences. First, we use the dataset from Pippa Norris, called "*British General Election Constituency Results, 2010-2019*", aggregated at year and police force area level.[20] Second, we use data from the Electoral commission about the results for Police and Crime Commissioners.[21] Additionally, we define as *left-party* the Labour party, Liberal Democratic party, Green party. This division reflects the parties' preferences about drug policies and the previous literature (e.g. Nowacki and Thompson (2021)).

From this information, we construct three different set of variables. The first set of variables is called *Drug poisoning/misuse death ratio* and they are define according to the formulas presented in Equations 1a and 1b.

$$Drug\,poisoning\,death\,ratio = Death\,by\,drug\,poisoning/Deaths \tag{1a}$$

$$Drug\,misuse\,death\,ratio = Death\,by\,drug\,misuse/Deaths \tag{1b}$$

The second set of variables uses the *Delta Deaths* which is the differences between overall deaths and overall drug related deaths. We called these variables *Adjusted drug poisoning/misuse death ratio* and are defined as in Equations 2a and 2b.

$$Adjusted\,Drug\,poisoning\,death\,ratio = Death\,by\,drug\,poisoning/Delta\,Deaths \tag{2a}$$

$$Adjusted\,Drug\,misuse\,death\,ratio = Death\,by\,drug\,misuse/Delta\,Deaths \tag{2b}$$

The third set of variables is generated from our independent variables. In analogous way, we generate the *Delta Crimes* which is the differences between overall offences and overall drug related offences. Subsequently, we define two variables: *Drug offences ratio* and *Adjusted drug offences ratio*. These variables are defined in Equations 3a and 3b.

$$Drug\,offences\,ratio = Drug\,offences/TotalOffences \tag{3a}$$

[15] Source of the definitions: Link ONS Definitions.

[16] They do not include other adverse effects of drugs, for example, anaphylactic shock, or accidents caused by an individual being under the influence of drugs.

[17] Drug abuse or drug dependence is defines by ICD-10 as mental and behavioural disorders due to use of: opioids (F11), cannabinoids (F12), sedatives or hypnotics (F13), cocaine (F14), other stimulants, including caffeine (F15), hallucinogens (F16) and multiple drug use and use of other psychoactive substances (F19). Source: Type of Drugs.

[18] The data are extrapolated from reports typically called "*Monthly figures on deaths registered in England and Wales*".

[19] Source: Link Home Office.

[20] Source: Pippa Norris Dataset.

[21] Source: Link Electoral Commission.

$$Adjusted\,Drug\,offences\,ratio = Drug\,offences/Delta\,Crimes \tag{3b}$$

3.1 Summary statistics

[TABLE 1 APPROXIMATELY HERE]

The findings in Table 1 indicate that drug poisoning deaths represent for around 0.6%, on average, of the overall deaths for police force area, while drug misuse deaths count, on average, for 0.4%. Drug offences are, on average, around 9% of total crimes. Finally, the share of left votes in parliamentary elections is, on average, 27% and the interaction between the share of left votes in parliamentary elections and the share of voted for left commissioners is, on average, 12%.

Table 1 presents the variables averages, but it does not describe how variables behave in different areas. To better understand that, in Figure 1 we plot the averages of drug-related deaths ratio and drug offences ratio by police force areas.[22]

[FIGURE 1 APPROXIMATELY HERE]

Figure 1 indicates a (noisy) interesting, negative correlation between drug deaths, both as drug poisoning and drug misuse, and drug criminal offences.[23] To have a more clear ideas about the evolution across time, we plot the trend of the total values in England and Wales across years in Figure 2.

[FIGURE 2 APPROXIMATELY HERE]

The graphs in Figure 2 indicate opposite patterns between drug deaths variables and drug-related crimes across time especially when we consider the presence of a time lag in the effect. While drug-related deaths are increasing in the left part graph, we notice that, in the same period, drug-related crimes are overall decreasing. Fig. 2 and Fig. 1 suggest a (preliminary) negative relationship between the two variables. However these graphs alone are not sufficient to indicate a negative, statistically significant, causal relationship between the two variables.

4 Empirical strategy

Figure 2 in Section 3.1 shows a negative correlation between drug deaths and drug offences. We start our empirical analysis by implementing a group of OLS regressions. To take into account possible time trends and possible systematic differences across different police force areas, we include in the regressions year and police force area fixed effects. Moreover, as seen in Fig. 1, there could be a time lag between variations in a arrests and drug deaths, generated for example by the time for the drug market to adjust after the arrests reduction (Adda et al., 2014). To better represent this scenario, we replicate our analysis of different lags of our independent variables. The OLS regressions can be expressed according to Equation 4.

$$y_{i,t} = \alpha + \beta X_{i,t-j} + PoliceForceAreaFE_i + yearFE_t + \epsilon_{i,t}, with\, j = 0, ..., 4,\ t = 2012, ..., 2016 \tag{4}$$

where $y_{i,t}$ represents drug-related deaths variables and $X_{i,t-j}$ drug-related offences variables at different lags. $PoliceForceAreaFE_i$ and $yearFE_t$ represent police areas fixed effects and year fixed effects.

However, the interpretation of the results from Equation 4 cannot be causal. As underline by Fisher and Nagin, 1978, we have good reasons to assume reciprocal causal influence of crime

[22] A similar Figure can be found for the adjusted variables.
[23] Similar results are presented for the adjusted variables. See in A1.

and law enforcement on each other, such as more policing can detect more crimes. These authors also mention the possible presence of a third (omitted) variable, influencing both police and crime which could undermine the causal interpretation of our findings. A first step is to use lagged values for our independent variables and to include fixed effects, as in Equation 4. However, the elements alone might not be enough to ensure the causal interpretation of the results.

To overcome the endogeneity issue, we implement an instrumental variable approach. As instrument we use the difference political preferences in local police force areas. As mentioned in Section 1.1, left-wing parties are more likely to have a less strict approach on drugs and more likely to favour depenalization. This instrument also allows us also to identify a specific channel of our effect, political affiliation.

Our instrument is share of vote for left-wing parties in the previous parliamentary elections. Given the low voter turnout of PCC elections, this variable better captures the political preferences in the area.

5 Results

To answer our research question, we will first examine the OLS results in Section 5.1. Even if biased, these findings can give an idea about the relationship between drug deaths and drug arrests. Second, we report the findings for the instrumental variable approach in Section 5.2.[24]

5.1 OLS

[TABLES 2 and 3 APPROXIMATELY HERE]

In Tables 2 and 3 we present the results of Equation 4 regressions using, as dependent variables, drug poisoning/misuse death ratio and adjusted drug poisoning/misuse death ratio. All coefficients are negative and significant, with two exception in Columns 10) of Tables 2 and 3, where the coefficients are still negative but no longer significant. Although the results have no causal interpretation, as explained in Section 4, they still provide some interesting information. These findings suggest that deaths by drug poisoning/misuse and drug offences are negative correlated, coherently with the trend expressed in Figures 1 and 2. Tables 2 and 3 show also the different effects based on different time lags. Although the coefficients are relatively similar, the significance levels varies with coefficients corresponding to 3 and 4 years before the elections having lower significance levels. As expected, the results are stronger in the short run rather than the long run. **In terms of magnitude, in table ?? to an increase of 1% of drug offence ratio decrease the drug poisoning deaths ratio between 1.1% (Col (2)) and 1.4% (Col (2)) and to an increase of 1% of adjusted drug offence ratio decrease the adjusted drug poisoning deaths ratio between 0.8% (Col (7) and Col (8)) and 1.1% (Col (6)). In terms of magnitude, in table ?? to an increase of 1% of drug offence ratio decrease the drug misuse deaths ratio between 1% (Col (4)) and 1.2% (Col (3)) and to an increase of 1% of adjusted drug offence ratio decrease the adjusted drug misuse deaths ratio between 0.8% (Col (9)) and 0.9% (Col (6)).**

5.2 IV regressions

As suggested in Section 4, we implement a IV strategy to ensure causality based on local political preferences for left-wing parties. The coefficients for the first stage are presented in Table 4.

[24] The results are presented here using the ratios variables. However, as suggested by Chamlin and Langworthy, 1996, level and ratios can sometimes have different results. We replicate the analysis using level variables and the findings are analogous and they are presented in Section A2 of the Appendix.

[TABLE 4 APPROXIMATELY HERE]

In Table 4 all coefficients are negative and highly statistically significant. The findings indicate that to an increase of left-wing votes/votes' share corresponds a decrease in drug related arrests, as suggested by the literature (e.g. Nowacki and Thompson, 2021). In terms of magnitude, to a 1% increase in the share of left voting corresponds a decrease between 7.7% (Column (5) of Table 4) and 11.6% (Column (1) of Table 4) in Drug offence ratio and a decrease between 9.7% (Column (10) of Table 4) and 15.1% (Column (6) of Table 4) in Adjusted Drug offence ratio. As indication from the previous literature, the main thread to an IV strategy is a weak instrument. However, the F-statistics of the first stage are always above the rule-of-thumb 10 value.[25] The exceptions are the specifications (7), (8) and (9) whose F-statistics are just below the critical 10% value in Stock and Yogo, 2002 but above the critical 15% value. Overall, the F-statistics point to a strong instrument.

In Tables 5 and 6, we present the IV findings for our benchmark analysis.

[TABLES 5 AND 6 APPROXIMATELY HERE]

The coefficients in Tables 5 and 6 are always negative and significant in all specifications, similar to the results in Tables 2 and 3 and as suggested by Figures 1 and 2. Overall, to an increase in our instrumented variables corresponds to a decrease in deaths by drug poisoning or deaths by drug misuse, in all specifications. Overall, there are some variations in terms of level of significance a cross the different lags, but the findings remain robust through all specifications in Tables 2 and 3. To a decrease of 1% of our instrumented variables for drug offence ratios corresponds a decrease between 4.2% (Column (3) in Table 5) and 7.4% (Column (5) in Table 5) in the deaths by drug poisoning ratio and between 2.9% (Column (6) in Table 5) and 4.9% (Column (10) in Table 5) in the deaths by drug misuse ratio. Similarly, to a decrease of 1% of our adjusted instrumented variables for drug offence ratios corresponds a decrease between 3.1% (Column (2) in Table 6) and 6% (Column (5) in Table 6) in adjusted drug poisoning ratio and between 2.2% (Column (6) in Table 6) and 4% (Column (10) in Table 6) in the adjusted drug misuse ratio.

Overall, the results in Tables 5 and 6 are indicating a statistically sign negative impact of our instrumented variables and drug-related deaths. Taken together, the findings presented in the previous tables suggest that the decrease in drug-related arrests increase the number of drug-related deaths. The previous literature about cannabis (e.g. Kilmer et al., 2010) suggest that a decrease in arrests generate a decline in the equilibrium price. This price reduction could increase the drug consumption and, as a consequence, drug-related deaths.

This mechanism is also present if the reduction in arrests is not uniform across different types of drugs. As suggested Section 1, the depenalization is mostly concentrated cannabis and it is possible, although we cannot control it in our analysis, that the majority of the decrease regards cannabis arrests. However, as suggested by Kelly and Rasul, 2014, cannabis and Class A drugs have negative cross price elasticity. This suggests that variations in cannabis prices can have impacts on Class A drugs use, reinforcing that mechanisms describe above.

6 Robustness check

In this Section, I test the robustness of the previous findings to a different definition of the instrument. *Share Left* represents the overall political "identity" of the police force areas. Given the high voters turnout of parliamentary elections, this instrument can be considered highly representative

[25] Additionally, the F-statistics in all specifications are all above the critical 10% value put forward by Stock and Yogo, 2002. Stock-Yogo weak ID test critical values: 10% maximal IV size 16.38, 15% maximal IV size 8.96, 20% maximal IV size 6.66, 25% maximal IV size 5.53.

of the local political preferences and it represents the political preferences of the *potential* PCC voters. However, *potential* voters are not *actual* voters and we cannot discard the possibility that, sometimes, local and national preferences, especially for PCCs, might not match. For example, some residents could be in favour of legalization as an overall principle but not in their neighbourhood, with a NIMBY-like syndrome.[26] Another example could be that the residents agree with other left-wing politics, such as unemployment benefits or environmental policies, but not their crime or drugs policies. A possible way to overcome these limitations is the results from PCCs elections. However, due to the very low voters' turnout, they, alone, cannot be a meaningful representation of local political preferences. To combine representativeness of higher level turnout and local voting preferences in terms of PCCs, we generate a new instrument as shown in Eq. 5.

$$Interaction = ShareLeftVotesParliamentXShareLeftVotesLeftPCCs \tag{5}$$

where $Interaction$ is our new instrument, $ShareLeftVotesParliament$ are the votes for the *Left* at the Parliamentary elections and $ShareLeftVotesLeftPCCs$ the votes for the *Left* in the PCCs elections.

In this Section, we replicate our previous IV analysis and the first stage findings are presented in Table 7.

[TABLE 7 APPROXIMATELY HERE]

Findings presented in Table 7 are similar to those presented in Table 4, with all coefficients being negative and significant. The F-statistics are all above 10, with one exception in Column (6) which is just below 10. Overall, this instrument seems to be less robust with respect to the previous one, although it does not offer from weak instrument issues. [27]

In Table 8 and 9 we present the findings for IV regressions using the new instrument.

[TABLES 8 AND 9 APPROXIMATELY HERE]

The coefficients in Table **??** are always negative and statistically significant in all specifications as in Tables 8 and 9. To a decrease in our instrumented variables corresponds an increase in drug deaths both as ratio and adjusted ratio. Also in this case, significance levels vary across different lags and specifications, but the coefficients remain robust. Specifically in Table 8, to a decrease of 1% of our instrumented variables for drug offence ratios corresponds a decrease between 3.5% (Column (4) in Table 8) and 6.1% (Column (6) in Table 8) in drug poisoning ratio and between 3.2% (Column (8) in Table 8) and 4.6% (Column (10) in Table 8) in the drug misuse ratio. Similarly in Table 9, to a decrease of 1% of our adjusted instrumented variables for drug offence ratios corresponds a decrease between 2.8% (Column (4) in Table 9) and 5.1% (Column (5) in Table 9) in adjusted drug poisoning ratio and between 2.6% (Columns (6) and (8) in Table 9) and 3.8% (Column (10) in Table 9) in the adjusted drug misuse ratio. Overall these findings indicate that the change in the definition of local political preferences do not change the direction and the robustness of our findings.

7 Conclusion

In this article we analyse the effect of reduction in drug related arrests on drug related deaths in England and Wales. We implement our analysis using an IV approach based on the local political preferences.

[26] According to the Oxford dictionary, NIMBY indicates: "A person who objects to the sitting of something perceived as unpleasant or hazardous in the area where they live, especially while raising no such objections to similar developments elsewhere".

[27] Additionally, the F-statistics are all above the critical 15% value for all specifications proposed by Stock and Yogo, 2002, with Columns (4), (5), (8), (9), (10) and (15) above the critical 10% value.See note 25.

The coefficients in the first stages show that to an increase in voting towards left-wing parties correspond a decrease in drug related arrests. The IV regressions results indicate that to a decrease of our instrumented variables correspond an increase in deaths by drug. The benchmark results indicate that to a decrease of 1% in our instrumented variables correspond to an increase between 0.04% and 0.07% the drug poisoning/misuse deaths ratio. Our findings are robust for different specifications, with different lags and different definitions of local and political preferences. Overall, our findings suggest that to a depenalization generated by a shift towards a more liberal/left-wing approach towards drugs corresponds on increase in deaths. The results are coherent with the findings of Kelly and Rasul, 2014 in the London experiment.

While it is true that some literature, as mentioned in Section 1.1, suggests that depenalization can have some benefits in terms of drug deaths, some main differences can be found with respect to our case. The majority of the cases describes in the previous literature are connected with policies at central government level and usually connected with other policies of prevention and treatment, like in Portugal. In our cases, this is not true, they are local depenalization, decided and implemented by the local police forces, with non connection to central and local government. Moreover, even if the single PCC communicates clearly to the police force his/her priorities, there are no clear guidelines at country level and PCCs are not able to extend or modify prevention and treatment which belong to the health services, to local councils and to national level policies.

Given these results, the main implication is that depenalization alone is not able to solve the problem. While in many countries, depenalization, decriminalization and legalization policies are discussed or present, it is not possible to simply depenalize drug consumption without implementing also a group of policies connected with prevention and treatment of drug addiction. Additionally, it is not possible to leave the police alone to deal with problem, but a community approach is required, mixing local level and national level polices.

References

Adda, J., McConnell, B., & Rasul, I. (2014). Crime and the depenalization of cannabis possession: Evidence from a policing experiment. *Journal of Political Economy*, *122*(5), 1130–1202.

Austen, L. (2016). Police and crime commissioners: Emerging "drug policy actors"? *Safer communities*.

Bachhuber, M. A., Saloner, B., Cunningham, C. O., & Barry, C. L. (2014). Medical cannabis laws and opioid analgesic overdose mortality in the united states, 1999-2010. *JAMA internal medicine*, *174*(10), 1668–1673.

Besley, T., & Coate, S. (2003). Elected versus appointed regulators: Theory and evidence. *Journal of the European Economic Association*, *1*(5), 1176–1206.

Caless, B., & Owens, J. (2016). *Police and crime commissioners: The transformation of police accountability*. Policy Press.

Canes-Wrone, B., Herron, M. C., & Shotts, K. W. (2001). Leadership and pandering: A theory of executive policymaking. *American Journal of Political Science*, 532–550.

Chamlin, M. B., & Langworthy, R. H. (1996). The police, crime, and economic theory: A replication and extension. *American journal of criminal justice*, *20*(2), 165–182.

Dobkin, C., & Nicosia, N. (2009). The war on drugs: Methamphetamine, public health, and crime. *American Economic Review*, *99*(1), 324–49.

Eck, J. E., & Maguire, E. R. (2000). Have changes in policing reduced violent crime? an assessment of the evidence. *The crime drop in America*, *207*, 207–265.

Fisher, F. M., & Nagin, D. (1978). On the feasibility of identifying the crime function in a simultaneous model of crime rates and sanction levels. *Deterrence and incapacitation: Estimating the effects of criminal sanctions on crime rates*, 361–99.

Grossman, M., Chaloupka, F. J., & Shim, K. (2002). Illegal drug use and public policy. *Health Affairs*, *21*(2), 134–145.

Hughes, C. E., & Stevens, A. (2010). What can we learn from the portuguese decriminalization of illicit drugs? *The British Journal of Criminology*, *50*(6), 999–1022.

Jones, T., Newburn, T., & Smith, D. (2012). Democracy and police and crime commissioners. *Policing: politics, culture and control*, 219–44.

Kelly, E., & Rasul, I. (2014). Policing cannabis and drug related hospital admissions: Evidence from administrative records. *Journal of Public Economics*, *112*, 89–114.

Kilmer, B., Caulkins, J. P., Pacula, R. L., MacCoun, R. J., Reuter, P., et al. (2010). *Altered state?: Assessing how marijuana legalization in california could influence marijuana consumption and public budgets*. RAND Santa Monica, CA.

Lister, S., & Rowe, M. (2015). Electing police and crime commissioners in england and wales: Prospecting for the democratisation of policing. *Policing and Society*, *25*(4), 358–377.

Livingston, M. D., Barnett, T. E., Delcher, C., & Wagenaar, A. C. (2017). Recreational cannabis legalization and opioid-related deaths in colorado, 2000–2015. *American journal of public health*, *107*(11), 1827–1829.

MacCoun, R., & Reuter, P. (2001). Evaluating alternative cannabis regimes. *The British Journal of Psychiatry*, *178*(2), 123–128.

MacCoun, R. J., Reuter, P., et al. (2001). *Drug war heresies: Learning from other vices, times, and places*. Cambridge University Press.

Nowacki, T., & Thompson, D. M. (2021). *Do elections increase local policy responsiveness? evidence from elected police commissioners* (tech. rep.). Working Paper.

Powell, D., Pacula, R. L., & Jacobson, M. (2018). Do medical marijuana laws reduce addictions and deaths related to pain killers? *Journal of Health Economics*, *58*, 29–42. https://doi.org/https://doi.org/10.1016/j.jhealeco.2017.12.007

Raine, J. W., & Keasey, P. (2012). From police authorities to police and crime commissioners: Might policing become more publicly accountable? *International journal of emergency services*.

Stock, J. H., & Yogo, M. (2002). Testing for weak instruments in linear iv regression.

Wen, H., Hockenberry, J. M., & Cummings, J. R. (2015). The effect of medical marijuana laws on adolescent and adult use of marijuana, alcohol, and other substances. *Journal of health economics*, *42*, 64–80.

Figures

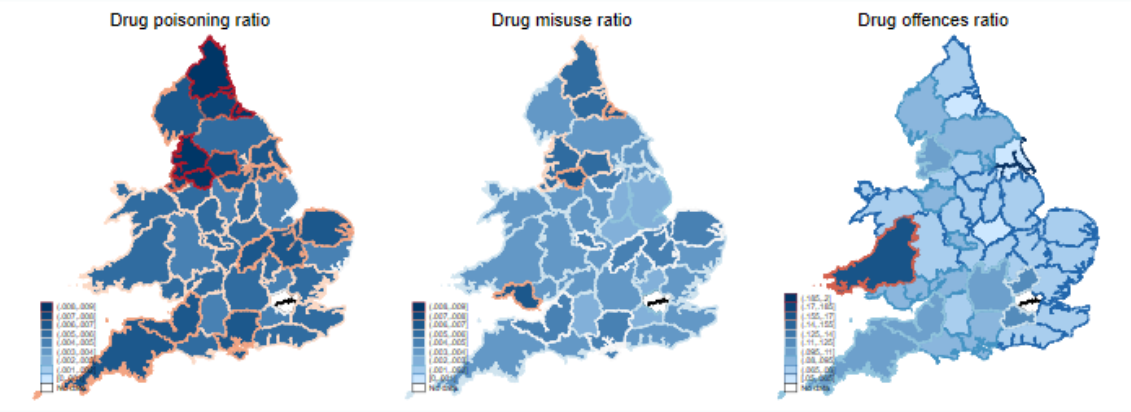

Figure 1: Drug deaths and offences across England and Wales

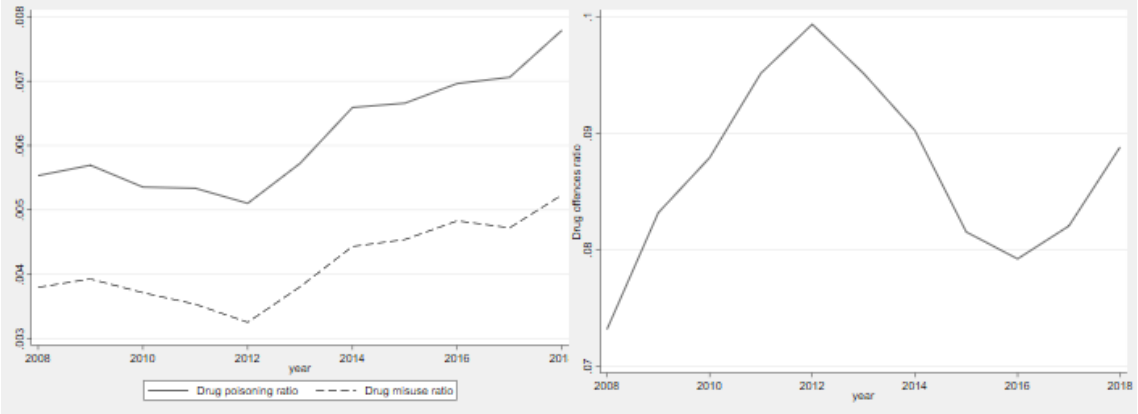

Figure 2: Deaths and Crime trends

Tables

Table 1: Summary Statistics

	count	mean	sd	min	max
Deaths variables:					
Drug poisoning death ratio	451	0.006	0.00	0.00	0.01
Drug misuse death ratio	451	0.004	0.00	0.00	0.01
Adjusted Drug poisoning death ratio	451	0.006	0.00	0.00	0.01
Adjusted Drug misuse death ratio	451	0.004	0.00	0.00	0.01
Drugs offences:					
Drug offences ratio	450	0.09	0.03	0.04	0.25
Adjusted Drug offences ratio	450	0.09	0.04	0.04	0.34
Political variables:					
Share left (parl)	451	0.27	0.26	0.00	0.77
Share Left (parl)X Share Left commissioner	448	0.12	0.13	0.00	0.55
Observations	451				
N. of police force area	41				
Year	2008-2018				

Notes: the rate of drug poisoning/drug misuse is the rate between drug poisoning/drug misuse and total number of deaths in the year per police force areas. *Left* includes Labour, Lib Dem, Green. *Share Left (parl)* is a variable reporting the share of votes for *Left* for Parliament election in the police area. *Share Left commissioner* is a variable reporting the share of votes for *Left* for Police commissioners in the police area. *Drug poisoning/misuse death ratio* is the ratio between drug poisoning/misuse death and total deaths. *Adjusted drug poisoning/misuse death ratio* is the ratio between drug poisoning/misuse death and delta deaths. *Drug offences ratio* is the ratio between drug offences and total offences. *Adjusted drug offences ratio* is the ratio between drug offences and delta crimes. Data at yearly and police forces areas level between 2008-2018.

Table 2: OLS regressions: Drug deaths and drug offences.

dep. var.:	Drug poisoning deaths ratio					Drug misuse deaths ratio				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Drug off. ratio(0 ago)	-0.014***					-0.011***				
	(0.00)					(0.00)				
	[-3.72]					[-4.13]				
Drug off. ratio(1 ago)		-0.011***					-0.011***			
		(0.00)					(0.00)			
		[-2.86]					[-4.47]			
Drug off. ratio(2 ago)			-0.012**					-0.012***		
			(0.01)					(0.00)		
			[-2.35]					[-3.63]		
Drug off. ratio(3 ago)				-0.013**					-0.010***	
				(0.01)					(0.00)	
				[-2.13]					[-2.82]	
Drug off. ratio(4 ago)					-0.013**					-0.006
					(0.01)					(0.00)
					[-2.40]					[-1.28]
Constant	0.007***	0.007***	0.007***	0.007***	0.007***	0.005***	0.005***	0.005***	0.005***	0.005***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	[21.82]	[20.88]	[16.30]	[14.34]	[15.89]	[21.15]	[23.23]	[17.72]	[15.89]	[12.19]
ID & YEAR FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	450	409	369	328	287	450	409	369	328	287
R2	0.676	0.694	0.713	0.720	0.732	0.716	0.739	0.764	0.766	0.777
#Force	41	41	41	41	41	41	41	41	41	41
#YEAR	11	10	9	8	7	11	10	9	8	7
Mean DV	0.0000588	0.0000593	0.0000602	0.0000614	0.0000634	0.0000394	0.0000397	0.0000403	0.0000409	0.0000423
Mean INDV	0.00149	0.00154	0.00161	0.00168	0.00176	0.00149	0.00154	0.00161	0.00168	0.00176

Notes: standard errors clustered at police force area level in parenthesis and t statistics in square brackets. *Drug poisoning death ratio* is the ratio between drug poisoning deaths and total deaths. *Adjusted drug poisoning death ratio* is the ratio between drugs poisoning death and delta deaths. *Drug offences ratio* is the ratio between drug offences and total offences. *Adjusted drug offences ratio* is the ratio between drug offences and delta crimes. *t ago* indicates that the variable is measured t years before. *DV* indicates dependent variables and *INDV* independent variables. Data between 2008 and 2019. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 3: OLS regressions: Adjusted Drug deaths and Adjusted drug offences.

dep. var.:	Adjusted drug poisoning deaths ratio					Adjusted drug misuse deaths ratio				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Adj. drug off. ratio(0 ago)	-0.011***					-0.009***				
	(0.00)					(0.00)				
	[-3.75]					[-4.24]				
Adj. drug off. ratio(1 ago)		-0.008***					-0.009***			
		(0.00)					(0.00)			
		[-2.84]					[-4.43]			
Adj. drug off. ratio(2 ago)			-0.008**					-0.009***		
			(0.00)					(0.00)		
			[-2.09]					[-3.40]		
Adj. drug off. ratio(3 ago)				-0.009*					-0.008***	
				(0.00)					(0.00)	
				[-1.77]					[-2.72]	
Adj. drug off. ratio(4 ago)					-0.010**					-0.004
					(0.00)					(0.00)
					[-2.23]					[-1.19]
Constant	0.007***	0.007***	0.007***	0.007***	0.007***	0.005***	0.005***	0.005***	0.005***	0.005***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	[25.72]	[24.68]	[18.25]	[15.36]	[17.69]	[24.94]	[26.63]	[19.63]	[18.17]	[13.79]
ID & YEAR FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	450	409	369	328	287	450	409	369	328	287
R2	0.675	0.693	0.711	0.718	0.731	0.715	0.738	0.762	0.765	0.776
#Force	41	41	41	41	41	41	41	41	41	41
#YEAR	11	10	9	8	7	11	10	9	8	7
Mean DV	0.00601	0.00607	0.00614	0.00625	0.00640	0.00402	0.00406	0.00410	0.00416	0.00427
Mean INDV	0.0949	0.0945	0.0948	0.0956	0.0962	0.0949	0.0945	0.0948	0.0956	0.0962

Notes: standard errors clustered at police force area level in parenthesis and t statistics in square brackets. *Drug misuse death ratio* is the ratio between drug misuse deaths and total deaths. *Adjusted drug misuse death ratio* is the ratio between drugs misuse death and delta deaths. *Drug offences ratio* is the ratio between drug offences and total offences. *Adjusted drug offences ratio* is the ratio between drug offences and delta crimes. *t ago* indicates that the variable is measured t years before. *DV* indicates dependent variables and *INDV* independent variables. Data between 2008 and 2019. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: IV Regressions: First stage (Benchmark)

dep.var.	Drug offences ratio					Adjusted drug offences ratio				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Sh.Left(0 ago)	-0.116***					-0.116***				
	(0.02)					(0.02)				
	[-4.94]					[-4.94]				
Sh.Left(1 ago)		-0.108***					-0.108***			
		(0.02)					(0.02)			
		[-4.71]					[-4.71]			
Sh.Left(2 ago)			-0.101***					-0.101***		
			(0.02)					(0.02)		
			[-4.34]					[-4.34]		
Sh.Left(3 ago)				-0.091***					-0.091***	
				(0.02)					(0.02)	
				[-4.11]					[-4.11]	
Sh.Left(4 ago)					-0.077***					-0.077***
					(0.02)					(0.02)
					[-4.29]					[-4.29]
F-Stat	24.43	22.16	18.87	16.90	18.36	24.43	22.16	18.87	16.90	18.36
Observations	450	409	369	328	287	450	409	369	328	287
#Force	41	41	41	41	41	41	41	41	41	41
#YEAR	11	10	9	8	7	11	10	9	8	7
Mean DV	0.00597	0.00603	0.00610	0.00620	0.00636	0.00399	0.00403	0.00407	0.00413	0.00424
Mean INDV	0.0856	0.0852	0.0854	0.0860	0.0865	0.0856	0.0852	0.0854	0.0860	0.0865
Mean IV	0.265	0.242	0.215	0.189	0.156	0.265	0.242	0.215	0.189	0.156
ID & YEAR FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Notes: standard errors clustered at police force area level in parenthesis and t statistics in square brackets. *Left* includes Labour, Lib Dem, Green. *Share Left* is a variable reporting the share of votes for *Left* in Parliament election in the police area. *Drug offences ratio* is the ratio between drug offences and total offences. *Adjusted drug offences ratio* is the ratio between drug offences and delta crimes. *Mean DV* is the mean of the dependent variable; *Mean INDV* is the mean of the instrumented variable; *Mean IV* is the mean of the instrument. *t ago* indicates that the variable is measured t years before. Data between 2008 and 2019. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: IV Results

dep. var.:	Drug poisoning deaths ratio					Drug misuse deaths ratio				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Drug off. ratio(0 ago)	-0.041***					-0.029**				
	(0.01)					(0.01)				
	[-2.90]					[-2.66]				
Drug off. ratio(1 ago)		-0.039**					-0.033***			
		(0.01)					(0.01)			
		[-2.64]					[-2.98]			
Drug off. ratio(2 ago)			-0.042**					-0.035**		
			(0.02)					(0.01)		
			[-2.65]					[-2.70]		
Drug off. ratio(3 ago)				-0.042**					-0.040**	
				(0.02)					(0.02)	
				[-2.15]					[-2.48]	
Drug off. ratio(4 ago)					-0.074***					-0.049**
					(0.03)					(0.02)
					[-2.80]					[-2.22]
F-Stat	24.43	22.16	18.87	16.90	18.36	24.43	22.16	18.87	16.90	18.36
Observations	450	409	369	328	287	450	409	369	328	287
#Force	41	41	41	41	41	41	41	41	41	41
#YEAR	11	10	9	8	7	11	10	9	8	7
Mean DV	0.00597	0.00603	0.00610	0.00620	0.00636	0.00399	0.00403	0.00407	0.00413	0.00424
Mean INDV	0.0856	0.0852	0.0854	0.0860	0.0865	0.0856	0.0852	0.0854	0.0860	0.0865
Mean IV	0.265	0.242	0.215	0.189	0.156	0.265	0.242	0.215	0.189	0.156
ID FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
YEAR FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Notes: standard errors clustered at police force area level in parenthesis and t statistics in square brackets. *Left* includes Labour, Lib Dem, Green. *Left vote* is a variable reporting the total votes for *Left* for Parliament election in the police area. *Left vote com.* is a variable reporting the total votes for *Left* for Police commissioners in the police area. *Drug offences ratio* is the ratio between drug offences and total offences. *Adjusted drug offences ratio* is the ratio between drug offences and delta crimes. *Drug poisoning death ratio* is the ratio between drug poisoning deaths and total deaths. *Adjusted drug poisoning death ratio* is the ratio between drug poisoning deaths and delta deaths. *Drug misuse death ratio* is the ratio between drug misuse deaths and total deaths. *Adjusted drug misuse death ratio* is the ratio between drug misuse deaths and delta deaths. *Mean DV* is the mean of the dependent variable; *Mean INDV* is the mean of the instrumented variable; *Mean IV* is the mean of the instrument. *t ago* indicates that the variable is measured t years before. Data between 2008 and 2019. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 6: IV Results

dep. var.:	Adjusted Drug poisoning deaths ratio					Adjusted Drug misuse deaths ratio				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Adj. drug off. ratio(0 ago)	-0.032**					-0.022**				
	(0.01)					(0.01)				
	[-2.68]					[-2.46]				
Adj. drug off. ratio(1 ago)		-0.031**					-0.026**			
		(0.01)					(0.01)			
		[-2.42]					[-2.70]			
Adj. drug off. ratio(2 ago)			-0.033**					-0.028**		
			(0.01)					(0.01)		
			[-2.43]					[-2.46]		
Adj. drug off. ratio(3 ago)				-0.033**					-0.031**	
				(0.02)					(0.01)	
				[-2.02]					[-2.35]	
Adj. drug off. ratio(4 ago)					-0.060**					-0.040**
					(0.02)					(0.02)
					[-2.70]					[-2.20]
F-Stat	16.92	15.78	13.97	13.55	17.88	16.92	15.78	13.97	13.55	17.88
Observations	450	409	369	328	287	450	409	369	328	287
#Force	41	41	41	41	41	41	41	41	41	41
#YEAR	11	10	9	8	7	11	10	9	8	7
Mean DV	0.00601	0.00607	0.00614	0.00625	0.00640	0.00402	0.00406	0.00410	0.00416	0.00427
Mean INDV	0.0949	0.0945	0.0948	0.0956	0.0962	0.0949	0.0945	0.0948	0.0956	0.0962
Mean IV	0.265	0.242	0.215	0.189	0.156	0.265	0.242	0.215	0.189	0.156
ID FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
YEAR FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Notes: standard errors clustered at police force area level in parenthesis and t statistics in square brackets. *Left* includes Labour, Lib Dem, Green. *Left vote* is a variable reporting the total votes for *Left* for Parliament election in the police area. *Left vote com.* is a variable reporting the total votes for *Left* for Police commissioners in the police area. *Drug offences ratio* is the ratio between drug offences and total offences. *Adjusted drug offences ratio* is the ratio between drug offences and delta crimes. *Drug poisoning death ratio* is the ratio between drug poisoning deaths and total deaths. *Adjusted drug poisoning death ratio* is the ratio between drug poisoning deaths and delta deaths. *Drug misuse death ratio* is the ratio between drug misuse deaths and total deaths. *Adjusted drug misuse death ratio* is the ratio between drug misuse deaths and delta deaths. *Mean DV* is the mean of the dependent variable; *Mean INDV* is the mean of the instrumented variable; *Mean IV* is the mean of the instrument. *t ago* indicates that the variable is measured t years before. Data between 2008 and 2019. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 7: IV Regressions: First stage

dep.var.	Drug offences ratio					Adjusted drug offences ratio				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Sh.LeftXSh.Left com.(0 ago)	-0.090***					-0.090***				
	(0.03)					(0.03)				
	[-3.49]					[-3.49]				
Sh.LeftXSh.Left com.(1 ago)		-0.090***					-0.090***			
		(0.02)					(0.02)			
		[-3.96]					[-3.96]			
Sh.LeftXSh.Left com.(2 ago)			-0.090***					-0.090***		
			(0.02)					(0.02)		
			[-4.18]					[-4.18]		
Sh.LeftXSh.Left com.(3 ago)				-0.087***					-0.087***	
				(0.02)					(0.02)	
				[-4.36]					[-4.36]	
Sh.LeftXSh.Left com.(4 ago)					-0.072***					-0.072***
					(0.02)					(0.02)
					[-4.11]					[-4.11]
F-Stat	12.16	15.64	17.48	19.02	16.89	12.16	15.64	17.48	19.02	16.89
Observations	447	407	368	328	287	447	407	368	328	287
#Force	41	41	41	41	41	41	41	41	41	41
#YEAR	11	10	9	8	7	11	10	9	8	7
Mean DV	0.00595	0.00601	0.00609	0.00620	0.00636	0.00398	0.00401	0.00406	0.00413	0.00424
Mean INDV	0.0858	0.0853	0.0854	0.0860	0.0865	0.0858	0.0853	0.0854	0.0860	0.0865
Mean IV	0.116	0.105	0.0911	0.0776	0.0636	0.116	0.105	0.0911	0.0776	0.0636
ID FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
YEAR FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Notes: standard errors clustered at police force area level in parenthesis and t statistics in square brackets. *Left* includes Labour, Lib Dem, Green. *Left vote* is a variable reporting the total votes for *Left* for Parliament election in the police area. *Left vote com.* is a variable reporting the total votes for *Left* for Police commissioners in the police area. *Drug offences ratio* is the ratio between drug offences and total offences. *Adjusted drug offences ratio* is the ratio between drug offences and delta crimes. *Mean DV* is the mean of the dependent variable; *Mean INDV* is the mean of the instrumented variable; *Mean IV* is the mean of the instrument. *t ago* indicates that the variable is measured t years before. Data between 2008 and 2019. * p < 0.1, ** p < 0.05, *** p < 0.01.

Table 8: IV Results

dep. var.:	Drug poisoning deaths ratio					Drug misuse deaths ratio				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Drug off. ratio(0 ago)	-0.047***					-0.033**				
	(0.02)					(0.01)				
	[-2.72]					[-2.40]				
Drug off. ratio(1 ago)		-0.046***					-0.034***			
		(0.02)					(0.01)			
		[-2.82]					[-2.90]			
Drug off. ratio(2 ago)			-0.040**					-0.032**		
			(0.01)					(0.01)		
			[-2.69]					[-2.67]		
Drug off. ratio(3 ago)				-0.035*					-0.037**	
				(0.02)					(0.01)	
				[-1.94]					[-2.59]	
Drug off. ratio(4 ago)					-0.061**					-0.046**
					(0.03)					(0.02)
					[-2.42]					[-2.32]
F-Stat	12.16	15.64	17.48	19.02	16.89	12.16	15.64	17.48	19.02	16.89
Observations	447	407	368	328	287	447	407	368	328	287
#Force	41	41	41	41	41	41	41	41	41	41
#YEAR	11	10	9	8	7	11	10	9	8	7
Mean DV	0.00595	0.00601	0.00609	0.00620	0.00636	0.00398	0.00401	0.00406	0.00413	0.00424
Mean INDV	0.0858	0.0853	0.0854	0.0860	0.0865	0.0858	0.0853	0.0854	0.0860	0.0865
Mean IV	0.116	0.105	0.0911	0.0776	0.0636	0.116	0.105	0.0911	0.0776	0.0636
ID FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
YEAR FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Notes: standard errors clustered at police force area level in parenthesis and t statistics in square brackets. *Left* includes Labour, Lib Dem, Green. *Left vote* is a variable reporting the total votes for *Left* for Parliament election in the police area. *Left vote com.* is a variable reporting the total votes for *Left* for Police commissioners in the police area. *Drug offences ratio* is the ratio between drug offences and total offences. *Adjusted drug offences ratio* is the ratio between drug offences and delta crimes. *Drug poisoning death ratio* is the ratio between drug poisoning deaths and total deaths. *Adjusted drug poisoning death ratio* is the ratio between drug poisoning deaths and delta deaths. *Drug misuse death ratio* is the ratio between drug misuse deaths and total deaths. *Adjusted drug misuse death ratio* is the ratio between drug misuse deaths and delta deaths. *Mean DV* is the mean of the dependent variable; *Mean INDV* is the mean of the instrumented variable; *Mean IV* is the mean of the instrument. *t ago* indicates that the variable is measured t years before. Data between 2008 and 2019. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 9: IV Results

dep. var.:	Adjusted Drug poisoning deaths ratio					Adjusted Drug misuse deaths ratio				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Adj. drug off. ratio(0 ago)	-0.037**					-0.026**				
	(0.01)					(0.01)				
	[-2.48]					[-2.23]				
Adj. drug off. ratio(1 ago)		-0.037**					-0.027**			
		(0.01)					(0.01)			
		[-2.51]					[-2.61]			
Adj. drug off. ratio(2 ago)			-0.032**					-0.026**		
			(0.01)					(0.01)		
			[-2.47]					[-2.46]		
Adj. drug off. ratio(3 ago)				-0.028*					-0.030**	
				(0.01)					(0.01)	
				[-1.88]					[-2.51]	
Adj. drug off. ratio(4 ago)					-0.051**					-0.038**
					(0.02)					(0.02)
					[-2.38]					[-2.31]
F-Stat	9.218	11.44	12.88	15.59	16.66	9.218	11.44	12.88	15.59	16.66
Observations	447	407	368	328	287	447	407	368	328	287
#Force	41	41	41	41	41	41	41	41	41	41
#YEAR	11	10	9	8	7	11	10	9	8	7
Mean DV	0.00599	0.00605	0.00613	0.00625	0.00640	0.00400	0.00404	0.00409	0.00416	0.00427
Mean INDV	0.0951	0.0946	0.0948	0.0956	0.0962	0.0951	0.0946	0.0948	0.0956	0.0962
Mean IV	0.116	0.105	0.0911	0.0776	0.0636	0.116	0.105	0.0911	0.0776	0.0636
ID FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
YEAR FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Notes: standard errors clustered at police force area level in parenthesis and t statistics in square brackets. *Left* includes Labour, Lib Dem, Green. *Left vote* is a variable reporting the total votes for *Left* for Parliament election in the police area. *Left vote com.* is a variable reporting the total votes for *Left* for Police commissioners in the police area. *Drug offences ratio* is the ratio between drug offences and total offences. *Adjusted drug offences ratio* is the ratio between drug offences and delta crimes. *Drug poisoning death ratio* is the ratio between drug poisoning deaths and total deaths. *Adjusted drug poisoning death ratio* is the ratio between drug poisoning deaths and delta deaths. *Drug misuse death ratio* is the ratio between drug misuse deaths and total deaths. *Adjusted drug misuse death ratio* is the ratio between drug misuse deaths and delta deaths. *Mean DV* is the mean of the dependent variable; *Mean INDV* is the mean of the instrumented variable; *Mean IV* is the mean of the instrument. *t ago* indicates that the variable is measured t years before. Data between 2008 and 2019. * p < 0.1, ** p < 0.05, *** p < 0.01.

Appendices

A1 Summary Statistics: Additional results

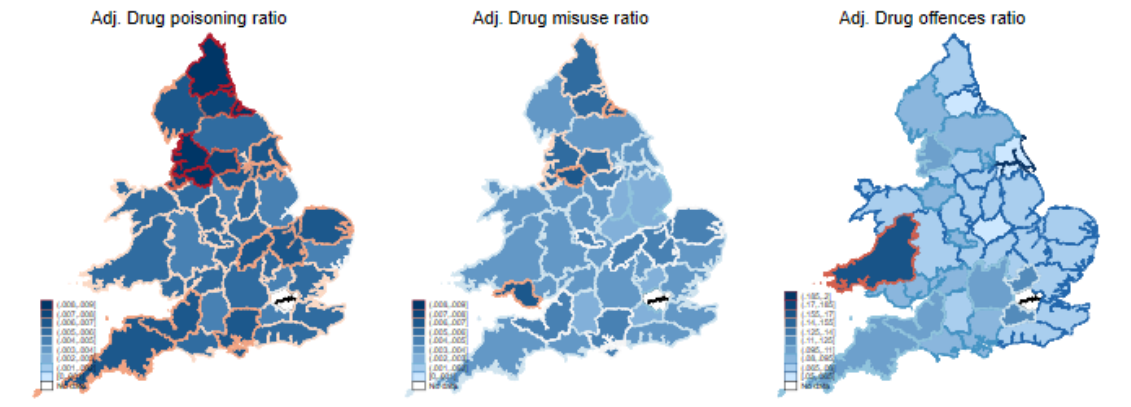

Figure 3: Adj. Drug deaths ratio and offences ratio across England and Wales

A2 Results: Additional results

A2.1 OLS: Additional results

Table A1: OLS regressions

dep. var.:	Drug poisoning deaths					Drug poisoning deaths				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Drug off.(0 ago)	-0.007***					-0.005***				
	(0.00)					(0.00)				
	[-4.50]					[-5.27]				
Drug off.(1 ago)		-0.007***					-0.006***			
		(0.00)					(0.00)			
		[-4.14]					[-5.28]			
Drug off.(2 ago)			-0.009***					-0.007***		
			(0.00)					(0.00)		
			[-3.45]					[-4.06]		
Drug off.(3 ago)				-0.008***					-0.007***	
				(0.00)					(0.00)	
				[-3.01]					[-3.60]	
Drug off.(4 ago)					-0.007**					-0.005**
					(0.00)					(0.00)
					[-2.53]					[-2.35]
Constant	81.775***	83.996***	88.339***	89.909***	89.209***	56.329***	58.315***	62.097***	63.237***	61.080***
	(2.72)	(3.29)	(4.92)	(5.60)	(5.48)	(1.78)	(2.06)	(3.47)	(3.96)	(4.45)
	[30.10]	[25.50]	[17.95]	[16.05]	[16.28]	[31.73]	[28.32]	[17.89]	[15.98]	[13.73]
ID& YEAR FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	451	410	369	328	287	451	410	369	328	287
R2	0.920	0.923	0.926	0.925	0.928	0.914	0.918	0.924	0.922	0.924
#Force	41	41	41	41	41	41	41	41	41	41
#YEAR	11	10	9	8	7	11	10	9	8	7
Mean DV	69.54	70.35	71.35	73.02	75.33	46.98	47.45	48.02	49.00	50.62
Mean INDV	1784.2	1841.9	1924.4	2018.0	2111.0	1784.2	1841.9	1924.4	2018.0	2111.0

Notes: standard errors clustered at police force area level in parenthesis and t statistics in square brackets. *t ago* indicates that the variable is measured t years before. *DV* indicates dependent variables and *INDV* independent variables. Data between 2008 and 2019. * p < 0.1, ** p < 0.05, *** p < 0.01.

A2.2 IV: Additional results

Table A2: IV Regressions: First stage (Level)

dep.var.	Drug offences				
	(1)	(2)	(3)	(4)	(5)
Left vote(0 ago)	-0.004***				
	(0.00)				
	[-4.55]				
Left vote(1 ago)		-0.004***			
		(0.00)			
		[-4.66]			
Left vote(2 ago)			-0.004***		
			(0.00)		
			[-4.85]		
Left vote(3 ago)				-0.003***	
				(0.00)	
				[-4.86]	
Left vote(4 ago)					-0.003***
					(0.00)
					[-5.19]
F-Stat	20.72	21.74	23.55	23.66	26.92
Observations	451	410	369	328	287
#Force	41	41	41	41	41
#YEAR	11	10	9	8	7
Mean DV	69.54	70.35	71.35	73.02	75.33
Mean INDV	1784.2	1841.9	1924.4	2018.0	2111.0
Mean IV	154166.4	139399.8	121351.8	106168.1	86646.3
ID & FE	Y	Y	Y	Y	Y

Notes: standard errors clustered at police force area level in parenthesis and t statistics in square brackets. *Left* includes Labour, Lib Dem, Green. *Left vote* is a variable reporting the total votes for *Left* for Parliament election in the police area. *Mean DV* is the mean of the dependent variable; *Mean INDV* is the mean of the instrumented variable; *Mean IV* is the mean of the instrument. *t ago* indicates that the variable is measured t years before. Data between 2008 and 2019. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A3: IV Results (level)

dep. var.:	Drug poisoning deaths					Drug misuse deaths				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Drug off.(0 ago)	-0.014**					-0.011**				
	(0.01)					(0.00)				
	[-2.59]					[-2.60]				
Drug off.(1 ago)		-0.019***					-0.015***			
		(0.01)					(0.00)			
		[-3.24]					[-3.51]			
Drug off.(2 ago)			-0.017***					-0.014***		
			(0.00)					(0.00)		
			[-3.45]					[-3.82]		
Drug off.(3 ago)				-0.013***					-0.013***	
				(0.00)					(0.00)	
				[-2.79]					[-3.47]	
Drug off.(4 ago)					-0.021***					-0.015***
					(0.01)					(0.00)
					[-4.05]					[-4.23]
F-Stat	20.72	21.74	23.55	23.66	26.92	20.72	21.74	23.55	23.66	26.92
Observations	451	410	369	328	287	451	410	369	328	287
#Force	41	41	41	41	41	41	41	41	41	41
#YEAR	11	10	9	8	7	11	10	9	8	7
Mean DV	69.54	70.35	71.35	73.02	75.33	46.98	47.45	48.02	49.00	50.62
Mean INDV	1784.2	1841.9	1924.4	2018.0	2111.0	1784.2	1841.9	1924.4	2018.0	2111.0
Mean IV	154166.4	139399.8	121351.8	106168.1	86646.3	154166.4	139399.8	121351.8	106168.1	86646.3
ID & YEAR FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Notes: standard errors clustered at police force area level in parenthesis and t statistics in square brackets. *Mean DV* is the mean of the dependent variable; *Mean INDV* is the mean of the instrumented variable; *Mean IV* is the mean of the instrument. *t ago* indicates that the variable is measured t years before. Data between 2008 and 2019. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.