Designing Policy in Weak States: Unintended Consequences of Alcohol Prohibition in Bihar

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Abstract

We study the impact of an alcohol-prohibition policy on crime in the Indian state of Bihar, where nearly 1.5 percent of the world's population lives. Using a difference-in-difference empirical strategy, we show that banning the sale and consumption of alcohol led to an increase in crime, even after adjusting for prohibition-related cases. The rise in violent and property crime is highest in districts with greater black-market prices of country liquor. Since state capacity and supply of police is fixed, diverting law enforcement resources towards implementing the alcohol ban effectively reduces institutional bandwidth to prevent crimes. The findings can be reconciled with a model where crime is deterred by both police enforcement and collective action. In places where public support for the policy was strongest, the rise in crime was found to be the smallest. Our results caution against 'big-bang reforms' in states with weak institutions.

Keywords: Alcohol prohibition, crime, collective action

JEL codes: D74, D78, K42, O17

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1 Introduction

What are the binding constraints to designing and executing policy in weak states? Political economy theories posit that elite capture and rent seeking are dominant explanations for a lack of 'political will' which result in policy failure (Bardhan, 2000; Krueger, 1990). Contrary to such explanations, however, developing countries do experiment with reforms. For example, in November 2016, the Prime Minister of India, in a live-televised address announced a ban on high value currency notes. The decision to demonetize 86 percent of the country's currency was aimed at reducing black money in the parallel economy. However, early evidence suggest that the policy is likely to have slowed economic growth (CMIE, 2017). Big-ticket reforms are popular in developing countries because they are considered to be 'vote catchers' and they are often backed by great zeal. But what is the cost of this frenzy? If a policy is hastily announced, without adequate planning, there could be significant costs that are borne by the society, which could otherwise have been avoided.

To shed light on this question, this paper examines the case of a recently legislated alcohol-prohibition policy in the Indian state of Bihar. Bihar provides a useful laboratory because the ban on alcohol was strictly enforced and the punishment for violating the new law were severe. Various Indian states have experimented with banning alcohol consumption in the past but their implementation has been "symbolic or partial" (Kumar, 2016). Previous prohibition policies have either been enforced gradually, across multiple years and in varying degrees, or have loopholes which pose identification challenges and prevents a rigorous assessment of the ban (see appendix for details on prohibition enforced in other Indian states). Unlike other prohibition policies, Bihar's universal ban on all types of alcohol (including country liquor), which was announced as a 'surprise' and enforced in strict intensity, makes it an attractive natural experiment to uncover the true causal impact of the policy.

We use a difference-in-differences (DiD) research design to analyze the impact of Bihar's alcohol prohibition policy on crime rates. We find that the ban leads to an increase in overall crime, including violent crime. We rule out competing explanations and show that the result of a positive impact of alcohol prohibition on crime is robust. There is suggestive evidence that the rise in crime is driven by an effective reduction in police's bandwidth as its attention gets diverted to prohibition-related enforcement activities. While a comprehensive evaluation of the policy is outside the scope of the paper, the findings of the study caution against impulsive decision making. This paper contributes to three broad sets of literatures: (1) the relationship between alcohol availability and crime; (2) crime deterrence

and displacement effects, and (3) unintended consequences of prohibition.

Firstly, previous scholarly work has documented that greater alcohol consumption leads to more crime but much of it is based in industrialized countries (Luca et al., 2015; Carpenter and Dobkin, 2011; Carpenter, 2005; Conlin et al., 2005; Markowitz, 2000)[1]. (Carpenter and Dobkin, 2010) also notes that a limitation of existing research is that it only focuses on violent crimes and ignoring the impact on non-violent crimes "may lead us to miss a substantial part of the social costs of alcohol consumption". We add to this literature by considering a developing country context and study all types of crimes in our analysis.

Secondly, this paper provides suggestive evidence on crime-displacement stemming from diversion of police resources towards implementing prohibition. Past studies have documented the deterrent effect of police vigilance on crime, which suggest that in the face of reduced band-width, crime is likely to rise (Munyo et al., 2016; Di Tella and Schargrodsky, 2004). Conventional understanding of crime spillovers has been limited to geographic applications (strict enforcement in one region leads to negative externalities in neighboring region) or inter-temporal/dynamic settings (strict enforcement today may lead criminals to postpone crime decisions to tomorrow) or trade-offs between private and social expenditures (Chalfin and McCrary, 2017; Munyo et al., 2016; Yezer, 2014; Dills et al., 2010; Ayres and Levitt, 1998). To our limited knowledge, (Yang, 2008) and (Poutvaara and Priks, 2009) are the only few papers to discuss how crime may be displaced across categories and this paper adds to this relatively under-explored mechanism.

Finally, several studies have shed light on the unintended consequences of prohibition and criminalization of activities. These inadvertent implications can be stemming from the emergence of a shadow economy, which is de-facto outside the legal purview. Friedman (1991) provides early evidences in this regard. It argues that "prohibition can cause more crime by diverting police resources away from deterring non-drug crimes and by incentivizing market participants to resort to violence in disputing market share and enforcing agreements". More recent work also posits a similar line of thought (Cunningham and Shah, 2018; Chimeli and Soares, 2017; Blattman et al., 2018; Albuquerque, 2016; Cameron et al., 2016; Adda et al., 2014; Owens, 2014; Adda et al., 2012; Keefer et al., 2010). The findings of our study speak to this growing body of research by providing evidence on increase in crime "following the transition of a market from legal to illegal" (Chimeli and Soares, 2017), alongside regulation-induced substitution of police efforts.

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[1]One exception is (Biderman et al., 2010)

The paper is structured as follows: section 2 sets the context and provides a background to Bihar's alcohol prohibition policy; section 3 provides a conceptual framework to assess the impact; section 4 outlines the identification strategy; section 5 and section 6 describes the data and results respectively and finally, section 7 concludes.

2   Background on Alcohol Ban Policy in Bihar

Nearly 1.5 percent of the world's population lives in the Indian state of Bihar. For a variety of reasons, ranging from colonial government's land tenure policy to post-independence India's industrial policy, Bihar has remained poor and its per capita income is one-third of the national average (Mukherji et al., 2012). Scholars consider 2005 as a turning point in Bihar's recent history because it brought to the helm a new government that was keen in undertaking rigorous governance reforms. Consequently, the decade following the regime change was transformative as Bihar made significant strides in building network infrastructure such as roads and bridges, expanding the supply of electricity, controlling law and order and improving its human capital by reducing out-of-school children and tackling health challenges.

A major emphasis area of the new regime was its focus on women's empowerment. It enacted policies to increase enrollment and attendance of girls in schools and implemented affirmative action policies aimed at boosting women's visibility in positions of power. Bihar is one of the few states in the country where 50 percent of the leadership positions in elected village councils and 35 percent of the jobs in the police force are exclusively set aside for women. As also documented by academic work (Bhalotra et al., 2018; Beaman et al., 2012; Jensen, 2012; Iyer et al., 2012), these policies can go a long way in boosting women's socio-economic status.

One significant intervention that merits attention is the Bihar Rural Livelihoods Project (BRLP) which aimed to "enhance the social and economic empowerment of the rural poor in Bihar" by forming self-help groups (SHGs). Each SHG comprised of 10-15 women which were in turn federated into village organizations and cluster-level federations. The program led to an unprecedented mobilization of women and one unanticipated outcome, *inter alia*, of this collective action was a creation of a constituency that would raise their voice against domestic/spousal violence and alcoholism.

According to the most reliable estimates, based on National Family Health Survey (NFHS) data in 2005, Bihar had the highest rates of domestic/spousal violence in the country (59 percent of ever-married women in the age 15-49 years reported to have experienced spousal violence) and a decade later, in 2015, the same survey reported that the incidence of violence against married women was still alarming high (43 percent). Given that these are self-reported data, it is reasonable to conclude that wife-beating is a critical issue in Bihar. In 2015, 29 percent of men in Bihar reported drinking alcohol and among those who drink, 14 percent drink almost every day, 36 percent consume it about once a week and 50 percent drink less than once a week (IIPS and ICF, 2017). The same survey also documents a positive association between drunkenness and domestic abuse: "women whose husbands consume alcohol are much more likely than women whose husbands do not consume alcohol to experience spousal violence, especially if the husband often gets drunk" (IIPS and ICF, 2017, p. 30).

When the new political regime came to power in 2005, it announced a new excise policy, relying on alcohol sale, in order to increase its tax base. Over time, the number of alcohol shops rose from 3,436 in 2006-07 to 5,467 in 2012-13, with villages reporting an increase of over 200 percent (IndiaToday, 2016). Excise revenue also swelled government coffers increasing from approx. INR 5 billion in 2007-08 to INR 36 billion in 2014-15 (Indian Express, 2016). In the year before the ban, excise revenue accounted for 1 percent of the state's GDP and 15 percent of the state's total tax earnings (Economic Survey, Government of Bihar).

As mentioned earlier, the period that saw a relaxed excise policy coincided with a dramatic strengthening of women's voices and collective action. There is anecdotal evidence illustrating that women's groups rallied against alcoholism in rural villages. Although the NFHS data for Bihar shows a (marginal) decline in both domestic violence and alcohol consumption among men between 2005 and 2015, it is important to clarify that the scope of the survey is limited, insofar that it only considers extreme forms of intra-household physical/psychological/sexual violence and does not consider harassment or molestation that could arise out of rowdy behavior nor does it consider the amount of alcohol consumed. In a panel survey conducted between 2004-05 and 2011-12, the percentage of respondents who reported that unmarried girls were sometimes or often harassed in their village/neighborhood tripled from 14.3 percent to 43.5 percent (Desai and Vanneman, 2005, 2015). According to the government data, consumption of country liquor increased from 24.76 mn LPL to 98.69; Indian Made Foreign Liquor's consumption increased from 8.9 mn LPL to 43.30 mn LPL and beer's consumption increased from 4.97 mn bulk liters to 57.67 mn bulk liters between 2006-07

and 2012-13 (Excise Department cited in Malhotra, 2014). Scattered media reports document some efforts by women's group to campaign for alcohol prohibition in their village, but there is no evidence of any large-scale systematic campaign across Bihar. However, women were vocal about their concerns and raised them at political rallies to elicit a response from the political leadership.

On 9 July 2015, it was Sushma Devi's (head of a SHG) question that drew out a big concession from the chief minister in the form of a promise to ban alcohol consumption if he was re-elected to office (Daniyal, 2016). Most analysts dismissed the idea of a universal prohibition policy as 'cheap talk' because excise revenues played a crucial role in Bihar's finance and it is was under the same regime that sale of alcohol was encouraged. On 26 November 2015, within days of winning his re-election, in a surprise move, the chief minister announced that his government would ban the sale of alcohol. The exact contours of the policy were fuzzy and these were clarified when the government enacted the Bihar Excise (Amendment) Act, 2016 on 30 March 2016. The objective of the policy was to "mitigate the damaging effects of alcohol consumption such as domestic-violence, inadequate household savings and public nuisance". Initially, the government planned to only ban country liquor (consumed mostly in rural area) and gradually phase out Indian Made Foreign Liquor (consumed mostly in urban areas) but on 5 April 2016, the government announced a complete ban on all types of alcohol, imposing severe penal provisions (upto 10 years imprisonment) for those found violating the law.

Even though the state's top bureaucrat admitted that it was unprepared to enforce the policy starting in April, the government began implementing regardless. (Gupta, 2017) explains the challenges in enforcement as "police coordination, cooperation with neighboring states, and addressing the financial implications of prohibition". The policy was chiefly enforced by the Excise department, in conjunction with the police and local administration. The role of police is important as it is involved in setting up check posts, monitoring the movement of vehicles, conducting raids, seizures and arrests. (Vij, 2016) neatly summarizes the enforcement process: "One of the ways the raids and arrests are made is through a complaint call center, whose number has been publicized across the state. Ten call center workers sit in a room in the excise department at the New Secretariat building in Patna, receiving on average a hundred calls a day. People call in to inform about the possession or consumption of liquor in their area. This information is immediately emailed to the excise superintendent, the collector and superintendent of police of the district. Whoever can reach the spot first carries out a raid." Table 1 provides an overview of how the enforcement burden is shared

among police and the excise department:

[Insert Table 1: Enforcement of Alcohol Prohibition in Bihar]

Data suggests that the police play an important role in the enforcement of the policy and qualitative accounts imply that this role has increased over time. In the one year since prohibition, almost 55 percent of the arrests were made by the police. On 2 October 2016, the government introduced an updated law (Bihar Prohibition and Excise Act, 2016) to address the criticisms of a judicial review, when the Patna High Court struck down the law that was passed in April. The new law aimed to "enforce, implement and promote complete Prohibition of liquor and intoxicants in the territory of the State of Bihar". If caught in violation of the law, the punishment is up to 10 years with a fine of of minimum INR 100,000, which may be extended to INR 10,000,000.

Enforcement has been aggressive with an average of 175 arrests and 935 raids per day between 1 April 2016 and 25 March 2018. Overall, more than 126,000 people have been arrested and sent to jail and more than two million liters of illicit liquor have been seized in nearly 650,000 raids.

3   Conceptual Framework

A priori, the impact of alcohol prohibition on crime is ambiguous. On one hand, crime could decline because of the following reasons:

- Inebriation effect - Alcohol consumption is positively associated with crime because drunken behavior and people not 'in control' of themselves are more likely to commit crime (Wechsler et al., 2002).

- Positive income effect - A rich body of economics literature has documented an inverse relationship between income (measured via rainfall shocks) and crime (Miguel, 2005; Sekhri and Storeygard, 2011; Blakeslee and Fishman, 2017; Iyer and Topalova, 2014). Banning alcohol has the advantage of improving household income because of savings from foregone expenditure on alcohol. People who might otherwise indulge in crime to spend on alcohol might refrain from doing so after prohibition.

- Collective action effect - If the policy is backed by popular support, then greater vigilance on part of the community might lead to a reduction in crime as it increases the

effective enforcement (even while assuming that policy supply is inelastic). This implication follows from self-enforcement models (Cook and MacDonald, 2011; Glaeser, 2008).

- Demonstration effect - A crackdown on prohibition-related 'crimes' and media coverage of the same might lend credibility to the policy commitment of the government which would in turn create an impression that law enforcement is strong, raising the perceived costs of crime.

There could also be a countervailing effect that increases crime because of the following reasons:

- Negative state capacity effect - Since excise revenue is a significant proportion of total state's earning, the foregone revenue could lead to weakened enforcement as the government's fiscal space is constrained (Blattman and Miguel, 2010).

- Negative income effect - In the face of unemployment and an income loss, workers in the alcohol production and allied activities might be more likely to engage in criminal activities. The 'push' factor is not limited to workers but also owners of alcohol shop licenses. In Bihar, typically, local strongmen who have connections to mafia gangs are involved in rent-thick activities such as distribution; a policy that cuts their source of earnings might push them back into crime. This channel could also operate from the demand side. Alcohol prohibition typically results in an increase in alcohol prices (in the black market) and those addicted to it might take to petty crime to meet their additional expenses (Buonanno et al., 2017; Blattman and Annan, 2016; Dix-Carneiro et al., 2016).

- Shadow economy effect - A complete ban on all alcohol related activity might lead to a parallel bootlegger economy which may lead to an increase in violent crimes as the black market expands and the mafia uses violence to enforce their contracts (Schelling, 1971; Pinotti, 2015).

- Crime displacement effect - Reprioritization of police efforts due to an increased focus on prohibition arrests/raids might divert attention from conventional prevention efforts and embolden criminals to resume (Yang, 2008; Priks and Poutvaara, 2007).

4   Empirical Strategy

Our primary objective is to investigate whether the above described alcohol prohibition policy led to unintended consequences. In doing so, we utilize a DiD approach, with Bihar as the 'treatment' group and Jharkhand (a neighboring state which was carved out of Bihar and where no such prohibition has been implemented) as the 'control' group. We expect Jharkhand to qualify as a suitable control group, especially since it was carved out of Bihar in 2001 and formed as a new state. Prior to 2001, Bihar and Jharkhand were one state, i.e. erstwhile Bihar. We thus expect the two states to have comparable socio-economic climate and institutional machinery.

The immediate enactment of a state-wide alcohol ban allowed us to design a well-identified DiD model, where we can compare two groups (Bihar versus Jharkhand) over multiple time periods (before and after the policy). This gives us the following basic econometric specification:

$$y_{dst} = \gamma AlcoholBan_{dst} + u_d + v_t + e_{dst} \tag{1}$$

where, y_{dst} is rate of crime, i.e. incidence of crime per 100,000 population in district d in state s in month t; u_d are district fixed effects; v_t are time FE; and e_{dst} is the idiosyncratic error term that is clustered at state-year level. $AlcoholBan_{dst}$ is a binary variable that takes value 1 if the district is located in Bihar and if $t \geq$ April 2016 (i.e. time period when the alcohol ban came into effect) and 0 otherwise. Each observation is recorded at district-month level. The sample period is from January 2013 to March 2018.

Before we move on to the main results, it will be instructive to consider the crime trends in treatment and control group over the sample period. Figure 1 illustrates that, before the ban, Bihar and Jharkhand manifest similar trends. However, once the policy was announced (short-dash line), a wedge develops, which continues to widen after the policy was implemented (long-dash line) and re-enacted (longdash-dot line). This figure provides evidence on the suitability of the chosen control group and also reveals relevant information on impact of the policy over time. Results of the formal DiD analysis are presented in section 6.

[Insert Figure 1: Depiction of Crime Trends in Bihar and Jharkhand]

Alongside the main DiD analysis, we conduct an auxiliary DiD analysis using continous

treatment variable. While the ban was implemented in all districts of Bihar, the intensity of policy-impact is likely to be contingent on the pre-policy level of alcohol consumption in each district. Utilizing this additional source of variation, we assign treatment to districts in Bihar over a continuum (i.e. in the range of 0 to 1), based on proportion of drinking population in each district.

Further, we check for heterogeneous impacts of the policy on crime, across districts. Through this analysis, we attempt to examine mechanisms that may be driving the results obtained. In doing so, we utilize variation in district-level, time-invariant baseline characteristics and check whether district with different characteristics were impacted differently by the policy. We examine characteristics such as access to communication channels, (i.e. supply of newspaper, coverage of telephone/mobile-phone network, internet services, etc.); presence of collective action groups (such as community workers and health activists); employment in alcohol or alcohol related industries, location of districts (i.e. border versus interior districts); alongside broader demographic factors such as literacy rate, labor force participation and proportion of urban population. We augment the analysis by also testing for heterogeneity by black market prices of alcohol. The specification for this ancillary analysis adds another layer to the aforementioned DiD specification, where the variable $BaselineCharacteristic_{ds}$, records discrete or continuous values associated with district-level characteristics. Results presented in Figure 7 and 8.

$$y_{dst} = \gamma AlcoholBan_{dst} + \delta AlcoholBan_{dst} \times BaselineCharacteristic_{ds} + u_d + v_t + e_{dst} \quad (2)$$

We also conduct several robustness checks to test the validity of our results. First, we consider an alternative treatment assignment. We restrict our sample to only include border districts of Bihar (BR) and Jharkhand (JH), i.e. Bihar districts at BR-JH border are assigned value 1 and Jharkhand districts at BR-JH border are assigned value 0. Second, we check for robustness to other policy changes that took place around the same time as the alcohol-ban. One such policy was a ban on sand-mining activities imposed by the National Green Tribunal (NGT) and later by the Patna High Court. The NGT directive to ban sand mining in the rivers during the monsoon months for environment and flood protection was enforced across the country but in Bihar, the Patna High Court also banned sand mining in three districts following reports of illegal mining. Third, we check for robustness of our results to other exogenous factors such as the 2017 floods in North Bihar.

5   Data

Data on the outcome variable, i.e. incidence of crime, was collected from police authorities of respective States. This data was collected at the district-month level for 14 different crime categories, including murder, rape, kidnapping and abduction, robbery, burglary, dacoity, theft and riot. We collected this data for all 38 districts in Bihar and 24 districts in Jharkhand, for the period, January 2013 to March 2018. Thus, we construct a panel data that records incidence of crime for 62 districts over 63 time periods .

For the purpose of our analysis, we define four broad classes of crime. The first class includes all cognizable crimes, i.e. total of crimes committed under the aforementioned individual categories as well as other cognizable offenses that are not classified under any of the individual categories. The second class includes violent crimes such as rape, murder, kidnapping and abduction. The third class includes property crimes such as theft, robbery, burglary and riot. The definition and composition of violent and property crime classes is based on the convention used in the literature (Blakeslee and Fishman, 2017; Iyer and Topalova, 2014). The fourth class, i.e. other crimes, includes all other cognizable crimes which aren't classified under violent or property crimes. For each of these classes, we calculate crime rates, i.e. incidence of crime per 100,000 population, which serves as the key outcome variable.

In addition to the above district-level data, we also utilized a novel dataset, which records entries of First Information Report (FIR), at the police station level. We were able to obtain this data for Bihar for the period October 2016 to March 2018. Through this data, we were able to obtain data on number of crimes reported against violation of the Bihar Prohibition and Excise Act (2016) (i.e. the alcohol ban). Violation of this Act is considered to be a cognizable offense and the accused may be subject to penal provisions of minimum 10 years of jail (which may extend to life-imprisonment) and a minimum fine of INR 1 lakh (which may extend to INR 10 lakh). Given that violation of the alcohol-prohibition policy is also a cognizable offense, we subtract these crimes from the first class of all cognizable crimes for the case of Bihar. This adjustment is critical to ascertain that the hypothesized change in crime post-ban is not being driven by an increase in crimes reported against violation of the prohibition Act. Similarly, the fourth crime class, i.e. others category, is also adjusted for prohibition.

The FIR dataset also helped us in understanding the composition of the fourth crime-class, i.e. others category. The data obtained from State Police authorities does not shed light on

what may entail the others category and simply considers it to be a residual of all cognizable offenses after accounting for violent and property crimes. We thus utilized the FIR dataset for this purpose and found that the others category mainly comprises of crimes such as rash-driving, wrongful restraint and violation of Electricity Act, Arms Act and Dowry Prohibition. While, this may not be the exact composition, owing to limited data, it does give offer some insights on how to interpret results obtained for impact on other crimes.

To conduct the auxiliary DiD analysis using continuous treatment variable, we garnered data on alcohol consumption at the district-level, using the latest round of National Family Health Survey (i.e. NFHS-4, 2015-16). Further, to conduct the heterogeneous effects analysis, we use data on district-level characteristics from Census (2011) and Economic Census (Sixth round- 2013-14). We use data from District Census Handbook (DCHB), which records data on village-level amenities such as availability of communication channels such as newspaper, telephone networks, internet services and collective action groups such as community workers and health activists. We aggregate this village-level data, after using population weights, to get district-level characteristics. To get data on demographic factors such as population density, sex-ratio, literacy rate and labor force participation, we use Primary Census Abstracts (PCA 2011), which records these variables at the district-level. From the Economic Census, we extract district-level data on employment in alcohol and alcohol related industries and activities. Data on political participation (overall voter turnout, male/female voter turnout) is accessed from Election Commission of India.

We also compile original data on alcohol prices in the black-market after the prohibition ban. Since alcohol is a differentiated industry with a variety of choices, we collected data on prices of country liquor in our primary survey. (Country liquor is the predominant choice of alcohol consumption in rural Bihar, which covers more than 80 percent of the total population in the state.)

6   Results

We first examine the impact of the alcohol-ban on crime. We then check for heterogeneous effects across districts. Finally, we conduct some robustness checks to test validity of our main results.

6.1 Impact on Crime

Table 2 reports our DiD estimates of the impact of alcohol-prohibition on crime. The estimates control for time and district fixed effects. Column (1) gives the estimated impact of the policy on all cognizable offenses, which suggests no effect of the policy. The findings in column (2), however, suggests that the ban led to a significant increase in rate of violent crime and property crime, to the tune of 0.274 per 100,000 population (25 percent of the mean) and 0.263 per 100,000 population (8 percent of the mean).

[Insert Table 2: DiD estimates of the effect of alcohol-prohibition on crime]

Table 3 reports estimates of the DiD analysis using continuous treatment variable. Consistent with the results obtained from the binary treatment variable (as shown in 2), we find a significant increase in violent crimes, post-policy. Additionally, we also find an increase in all cognizable offences, to the tune of 3 per 100,000 population (20 percent of the mean). We continue to use the main DiD strategy (i.e. using binary treatment variable) as our preferred specification, since the policy-treatment was rolled out at the state level. Nevertheless, it is pertinent to note that the key results are robust to alternative empirical strategies as well.

[Insert Table 3: DiD estimates of the effect of alcohol-prohibition on crime using continuous treatment variable]

To examine these results further, we conducted an auxiliary analysis to investigate the effect of the policy, once the Bihar Government re-promulgated the law. On 30 September 2016, the judiciary struck down the April notification as it was "ultra vires to the Constitution". Unfazed, couple of days later, on 2 October 2016, the Government formulated the Bihar Prohibition and Excise Act, 2016 which reacted the all penal provisions associated with violation of the ban, i.e. minimum 10 years of jail term which may extend to imprisonment for life besides a minimum fine of INR 1 lakh which may extend to INR 10 lakh. The introduction of this stringent law entailed stricter enforcement and prime focus was accorded to implementation of the policy by the Police and Excise department and other Government authorities. As per data from excise department, 102,879 arrests were made in violation of the Prohibition Act between October 2016 and February 2018. In order to check for the impact of this stricter policy, we use the following specification, where the variable $PostOct2016$ takes value 1 for all time periods after October 2016 and 0, otherwise.

$$y_{dst} = \gamma AlcoholBan_{dst} + \delta AlcoholBan_{dst} \times PostOct2016 + u_d + v_t + e_{dst} \quad (3)$$

Table 4 presents our DiD estimates of the above specification. It is worth noting that our estimates show that a stricter enforcement of the Act led to a significant increase in rate of all cognizable crimes (indicated by the positive and significant coefficient of interaction term in column(1)). Further, the effect on violent crimes strengthened. Results from column 2 suggest that after re-enforcement of the Act, reporting of violent crimes increased further, accounting for a net increase of 0.291 (amounting to 26 percent of the mean). Further, there is also a significant increase in property crimes and other crimes post-ban after October 2016.

[Insert Table 4: Effect of policy re-enactment on crime]

While these results are seemingly counter-intuitive, they can be reconciled in light of a crime-displacement theory (Yang, 2008). In the context of alcohol prohibition in Bihar, the crime-displacement theory would suggest that reprioritization of police efforts in enforcing the Prohibition Act may have diverted attention away from the prevention of other non-prohibition crimes violent and property crimes. We plan to further substantiate this analysis and quantify the hypothesized substitution effect in future research. Meanwhile, we check for heterogeneous effects of the impact across districts for multiple characteristics to shed light on the proposed mechanisms of impact.

6.2   Heterogeneous Effects

We check for heterogeneous effects of the policy for the following channels:

- **Communication**: Under this we investigate whether the policy has a significantly different impact on crime in districts that have greater access to media and communication channels such as newspaper, post-office, telegraph, telephone, public phones, mobile phone and internet. We expect that enforcement of the policy and achievement of its intended objectives might have been more effective in districts with stronger communication channels.

- **Collective action**: Similarly, we investigate whether the policy has a significantly different impact on crime in districts that have strong presence of collective action groups such as community health workers, agricultural credit societies and self-help groups. Under this channel, we also check whether districts covered by the Bihar Rural Livelihood Project (BRLP) - *Jeevika*, were impacted differently. This program seeks to enhance social and economic empowerment and played an important role in

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mobilizing women-communities to demand for alcohol prohibition. We thus expect that the policy would have been more effective in districts with stringer collective action.

- **Black market prices**: We use prices of country liquor in rural Bihar (collected after the alcohol ban) to shed light on the 'shadow economy effect'. In so far as black market prices are a proxy for the demand of alcohol in a given district, we expect higher prices to be associated with greater crime.

- **Electoral turnout**: In a similar vein, we check for heterogeneous effects of the prohibition-policy among districts with varying levels of electoral turnout. Under this channel, we check for both total turnout and turnout by gender.

- **Demography**: We also examine whether demographic factors such as literacy rate, labor force participation, percentage of urban population, percentage of disadvantaged groups such as scheduled caste and scheduled tribe, sex-ratio cause any heterogeneity in impact of the policy across districts.

- **Alcohol-dependent enterprises**: The alcohol-ban also led to revenue losses, which were earlier being earned through sale of alcohol. In light of this immediate implication of the policy, we also check for differences in impact across districts with varying levels of employment in the food and accommodation industry (which we use as a proxy for alcohol industry in absence of date on sub-industries). A plausible mechanism of impact may be that districts with higher dependence on these industries are likely to have faced a negative income shock post-ban, which may have in turn led to change in crime.

Figure 7 presents our results for the heterogeneous analysis. We first check for heterogeneous effects of the policy across districts with different levels of literacy rate (column 1), electoral participation of women (column 2), employment share in food and accommodation industry (used as proxy for alcohol and alcohol-related industries) (column 3) and urban population (column 4). None of these mechanisms seem to have an effect.

[Insert Figure 7: No heterogeneous effects of alcohol prohibition on crime]

Estimates from Figure 8 suggest that there are media/information, collective action and a parallel bootlegging economy might be important factors. Panel A depicts districts with stronger media channel (measured by percentage of villages in a district that receive daily

newspaper supply or have access to mobile phones) witnessed a lower increase in crime (denoted by negative coefficient of interaction term). This reduction could be stemming from widespread dissemination of information on the policy and its penal provisions, which may have aided and enabled efficient enforcement of the policy, without much diversion of police efforts. The negative interaction sign is consistent across crime categories. However, the favorable effect of strong communication and media channel does not conclusively overpower the crime-displacement effect - indicated by a net increase in rate of all cognizable crimes, in places with good newspaper supply).

Similarly in Panel B, we find that while crime increased after the prohibition, districts which had greater self help groups or where project *Jeevika* was implemented faced a reduction in crime. *Jeevika* volunteers played a central role in mobilizing women-communities to demand for alcohol prohibition. Even before, the Prohibition Act came out, *Jeevika* volunteers succeeded in getting four villages from its catchment areas alcohol-free. In light of such strong collective action and community mobilization, it is likely that the alcohol-ban was able to achieve its intended objective of reduction in crime, overpowering the displacement effect. However, yet again we find that the favorable effects of collective action do not necessarily overcome the crime-displacement effect, as indicated by a net increase in rate of all cognizable crimes.

Panel A and B suggest that a conducive socio-economic climate can play a critical role in effective implementation of a policy. In Panel C, we consider the differential impact of black markets. We find that overall crime rises in border districts, relative to interior districts and that districts which had above median black market prices of alcohol are associated with greater violent and property crime.

[Insert Figure 8: Heterogeneous effects of alcohol prohibition on crime]

6.3 Robustness

In our first robustness check, we check if our results are valid for an alternative specification of treatment. Under this specification, we restrict the sample to only include border districts (i.e. districts at the Bihar - Jharkhand border). In light of the fact that borders can be porous, we expect enforcement of the ban to be less effective at the border. We thus check whether our results continue to hold if we only include border districts. Results from table 5 suggest

an increase in crime, across all 4 crime categories, post-ban. Thus, our primary results are robust to the restricted sample of border districts.

[Insert Table 5: Robustness to restricting sample to only neighboring border districts]

In the second robustness check, we examine whether our primary results are robust to other policy changes that took place during our study period. In particular, we check whether our results are robust to the ban on sand-mining activities, issued by the Patna High Court. The ban on sand-mining activities may serve as an alternative explanation for the observed increase in crime, owing to losses in revenue (which were earlier being earned through mining activities) and a general sense of discontentment among mining employees and traders. To check this, we restrict our sample by dropping nine districts from Bihar that accounted for majority of the illegal sand-mining activities in the state (according to news reports). Our estimates presented in table 6, suggest that our result is fairly robust and that the increase in violent crime may be attributed to the alcohol-prohibition policy, rather than the ban on sand mining.

[Insert Table 6: Robustness to restricting sample to districts where sand mining is less frequent]

Thirdly, we check for robustness to the massive floods that hit several districts in North Bihar in March 2018. The quest for survival in disaster-hit regions, alongside major loss of life and property, may offer an alternative explanation for the observed increase in crime. To check for this, we drop 18 districts from North Bihar that were severely affected by the flood. The DiD estimates of this robustness check (shown in table 7) further indicates robustness of the the primary results. This suggests that the increase in violent crime and property crime is not an aftermath of the floods and is likely to be stemming from the alcohol-ban.

[Insert Table 7: Robustness to restricting sample to districts not affected by North-Bihar floods]

Finally, we also run few specification checks to gauge whether our results are robust to alternative specification of the outcome variable, i.e. natural log of crime and natural log of crime rate. Estimates from Table 8 suggest an increase in violent cirme, consistent with the results from table 2.

[Insert Table 8: Robustness to alternative specification (outcome variable as log crime)]

Similarly, estimates from table 9 indicate an increase in violent and property crimes, consistent with the results from table 2.

[Insert Table 9: Robustness to alternative specification (outcome variable as log crime rate)]

7 Discussion

(Rahman, 2004) shows that the timing of announcement of alcohol prohibition policies in Indian states are closely tied to political considerations, instead of being motivated by true paternalistic concerns. Unsurprisingly, therefore, governments choose to ban instead of levying a 'sin tax'. Nevertheless, there is little empirical evidence to guide policy makers on the causal impact of prohibition policies, as existing research relies on policies which have been half-heartedly implemented. In an address to citizens, in August 2016, the Chief Minister of Bihar wrote, "What sets the liquor prohibition apart is that no one in the past has been able to deliver it totally" (Kumar, 2016). The case of alcohol prohibition in Bihar provides a clean natural experiment to examine this question. We find that the ban led to an increase in crime, and this was likely to driven by crime displacement. While popular support for the policy might counter some of these effects, the role of law enforcement and proper planning must not be discounted.

A limitation of the current paper is that it only focuses on the impact along a singular dimension, i.e. crime. Admittedly, the first order impacts would be on spousal violence and incidents of public nuisance. Unfortunately, we don't observe these in our administrative datasets and would ideally need to conduct a household survey to uncover these impacts. In a field survey conducted in 4 districts among nearly 5,000 poor households in 250 villages across Bihar between December 2016 and January 2017, respondents reported that the main advantages of alcohol prohibition are: able to save money (37.4 percent), less hooliganism (27.2 percent), reduced violence against women (12.4 percent), can walk freely in evening (9.7 percent) and less crime (9.8 percent) (Dar, Kumar and Verma, 2018). Future research should investigate the consequences along other dimensions so that the welfare consequences of such policies may be comprehensively evaluated.

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A Figures

Figure 1: Crime rate in Bihar and Jharkhand
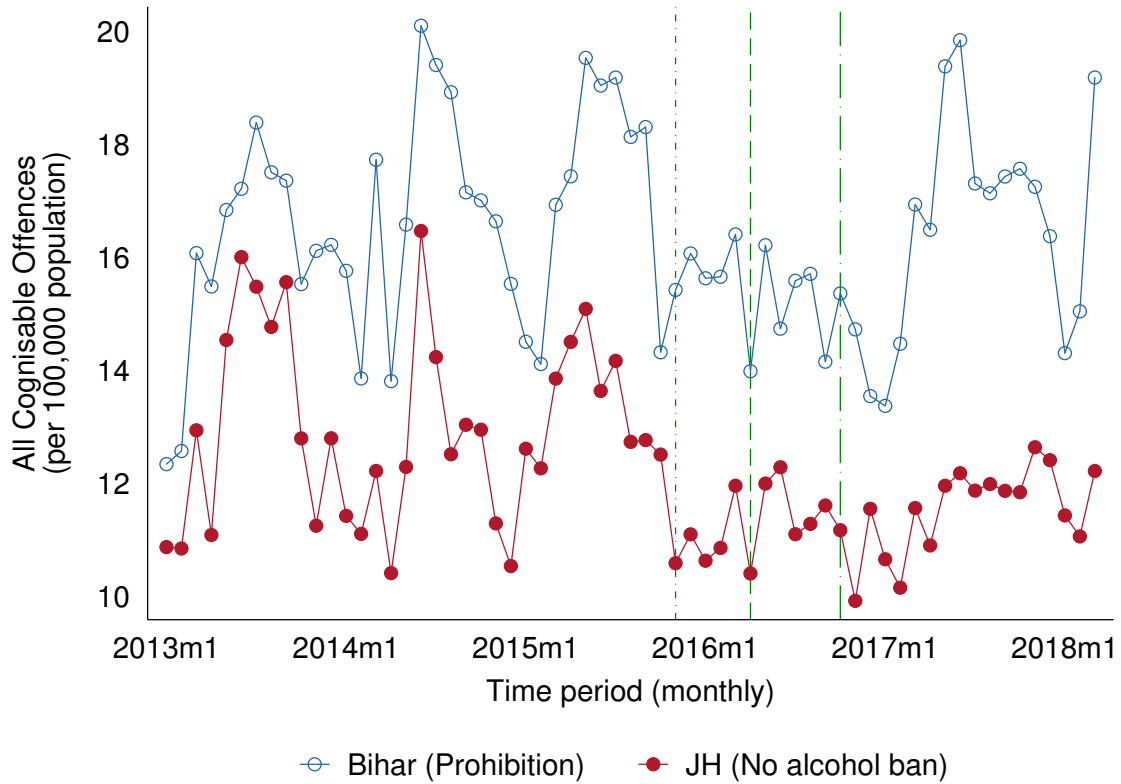
Note: The shortdash-dot line refers to policy announcement (November 2015); dash line refers to policy implementation (April 2016); longdash-dot line refers to policy re-enactment (October 2016).

Figure 2: Geographic coverage of estimating sample
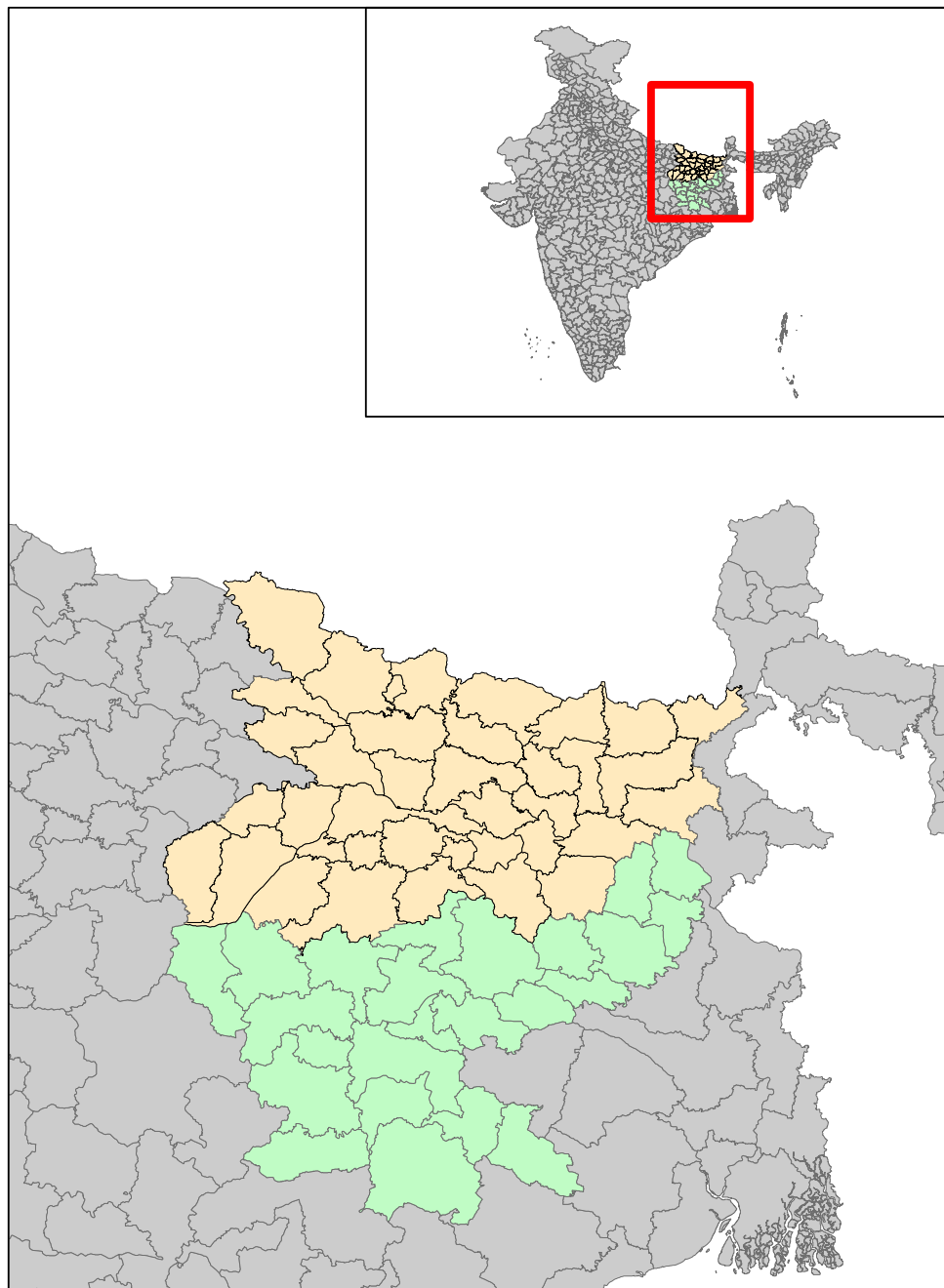
Note: The districts in Bihar (treatment) are colored in rose/beige whereas those in Jharkhand (control) are in green. Together, these two states account for approx. 1.7 percent of the world's population.

Figure 3: Trends in supply of police
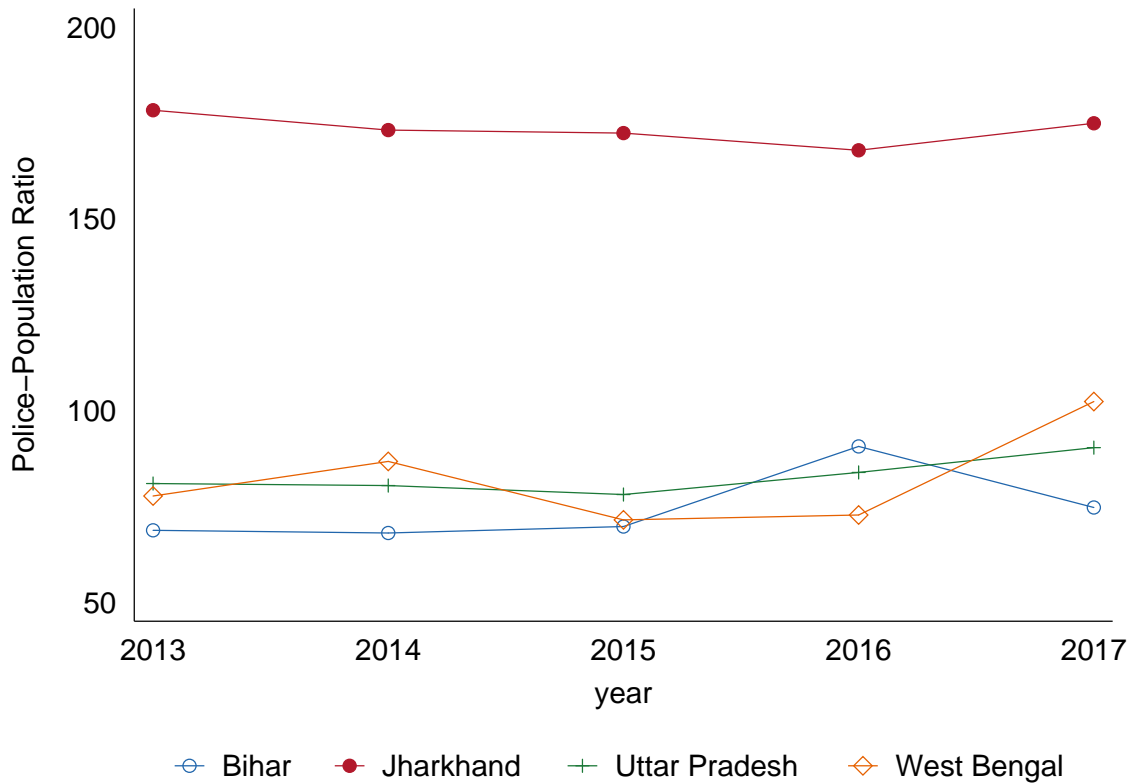
Note: The Police-population ratio is defined as the number of policemen per 100,000 population. The data for Bihar and all its neighboring states is illustrated, even though the estimating sample does not include Uttar Pradesh and West Bengal (because district-month crime data for these states was not available). Source: Bureau of Police Research and Development (BPRD) Data on Police Organizations 2013-2017 (Chapter 1 Basic Police Data Table 1.1).

Figure 4: Trends in the probability that a criminal is caught
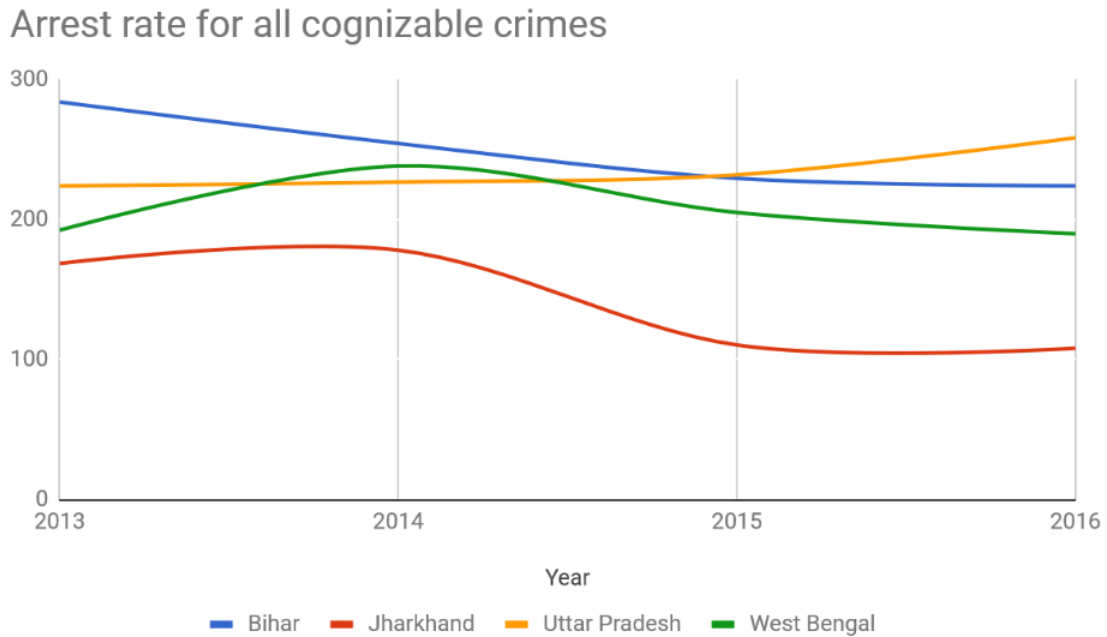
Note: Arrest rate is calculated as the number of arrests divided by the mid-year population and is reported per 100,000 population. The above figure includes all cognizable crimes defined under the Indian Penal Code. A cognizable crime is an offense where the Police can arrest a person without a warrant. The data for Bihar and all its neighboring states is illustrated, even though the estimating sample does not include Uttar Pradesh and West Bengal (because district-month crime data for these states was not available).

Figure 5: Impact of prohibition on excise revenue
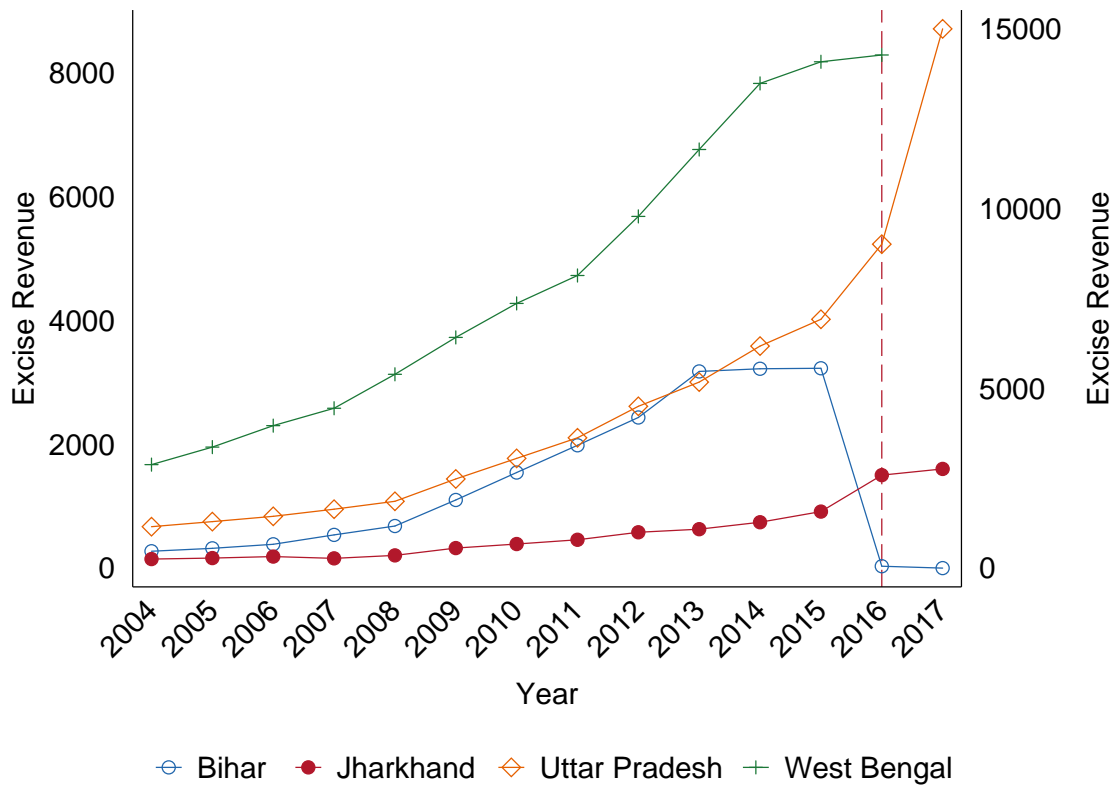
Note: The figure depicts the change in revenue earned from sale of alcohol in Bihar and its neighboring states. The axis on the left corresponds to Bihar, Jharkhand and West Bengal. The axis on the right refers to Uttar Pradesh. The data for Bihar and all its neighboring states is illustrated, even though the estimating sample does not include Uttar Pradesh and West Bengal (because district-month crime data for these states was not available). Source: Excise/finance department of various states.

Figure 6: Alcohol prohibition enforcement intensity
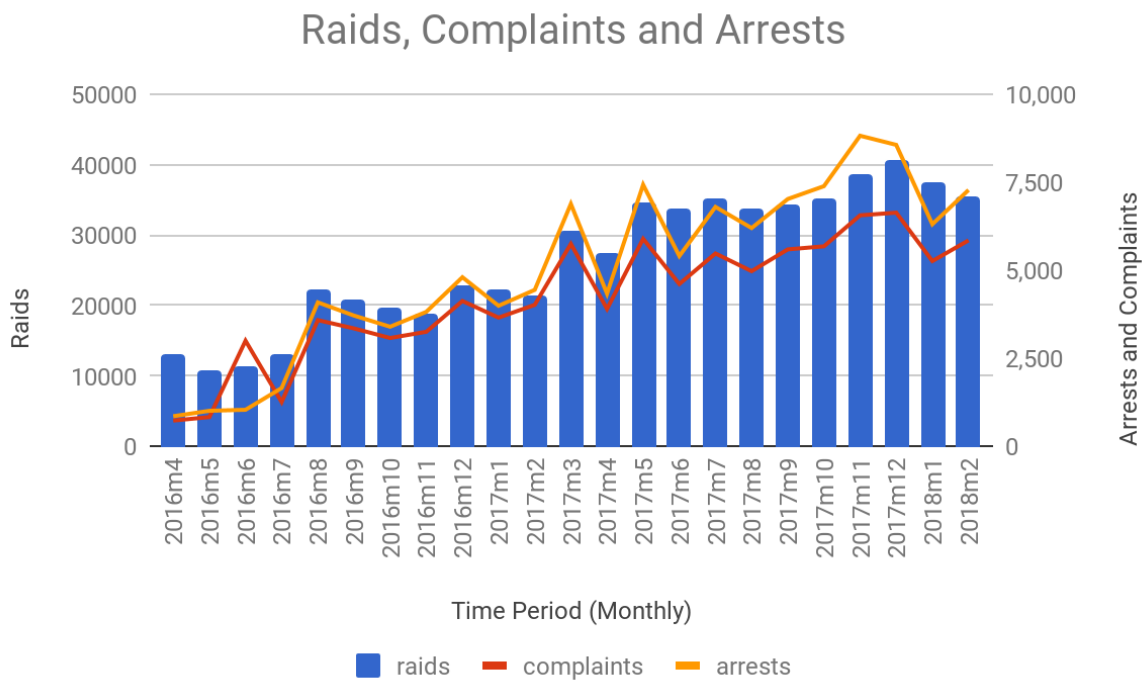
Note: The figure shows total enforcement by Bihar Police and Bihar Excise Department for the period April 2016-February 2018. In the period 1st April 2016 to 28th February 2018, 613,194 raids were conducted, 97,074 complaints were registered and 115,243 individuals were arrested. Source: Excise Department, Bihar and Bihar Police.

B   Tables

Table 1: Enforcement of alcohol prohibition in Bihar

Agency	Raids	Cases	Arrests
Excise dept.	223,307 (33%)	45,321 (43%)	40,100 (32%)
Police	453,317 (67%)	59,780 (57%)	86,348 (68%)
Total	676,624 (100%)	105,101 (100%)	126,448 (100%)

Note: The data are for April 2016-March 2018. Police refers to zonal IG Patna, Muzaffarpur, Darbhanga and Bhagalpur which together encompass all districts of Bihar, including those under the jurisdiction of Government Railway Police (GRP). Source: Excise & Prohibition Dept., Government of Bihar.

Table 2: DiD estimates of the effect of alcohol-prohibition on crime (using binary independent variable)

	(1) All Cognizable	(2) Violent Crimes	(3) Property Crimes	(4) Other Crimes
Alcohol Ban	0.787	0.274	0.263	0.249
	(0.526)	(0.077)***	(0.119)**	(0.415)
N	3,906	3,906	3,906	3,906
Mean	15	1.1	3.3	10

Note: Each observation is at district-month level. The sample includes 62 districts, 38 in treatment group and 24 in control group, for the period January 2013 to March 2018. The outcome variable in column (1) is rate of all cognizable crimes (per 100,000 population). Outcome variable in column(2) is rate of violent crimes. Violent crimes include rape, kidnapping and murder. Outcome variable in column(3) is rate of property crimes. Property crimes include burglary, dacoity, robbery, theft and riot. Definitions of violent and property crimes is based on (Blakeslee and Fishman, 2017) and (Iyer and Topalova, 2014). Outcome variable for column (4) is rate of other crimes, which include non-property and non-violent crimes such as wrongful restraint, rash driving and violation of electricity act, arms act, dowry prohibition, etc. Model includes district and time fixed effects. Standard errors, in parentheses, are clustered at state-year level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 3: DiD estimates of the effect of alcohol-prohibition on crime (using continuous independent variable i.e. proportion of drinking population in district)

	(1) All Cognizable	(2) Violent Crimes	(3) Property Crimes	(4) Other Crimes
% drinking population	3.002	0.890	1.139	0.972
	$(1.335)^{**}$	$(0.239)^{***}$	(0.731)	(1.164)
N	3,906	3,906	3,906	3,906
Mean	15	1.1	3.3	10

Note: Each observation is at district-month level. The sample includes 62 districts, 38 in treatment group and 24 in control group, for the period January 2013 to March 2018. The outcome variable in column (1) is rate of all cognizable crimes (per 100,000 population). Outcome variable in column(2) is rate of violent crimes. Violent crimes include rape, kidnapping and murder. Outcome variable in column(3) is rate of property crimes. Property crimes include burglary, dacoity, robbery, theft and riot. Outcome variable for column (4) is rate of other crimes, which include non-property and non-violent crimes such as wrongful restraint, rash driving and violation of electricity act, arms act, dowry prohibition, etc. Model includes district and time fixed effects. Treatment is assigned as a continuum based on proportion of people consuming alcohol in each district. Standard errors, in parentheses, are clustered at district level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: Effect of policy re-enactment on crime

	(1) All Cognizable	(2) Violent Crimes	(3) Property Crimes	(4) Other Crimes
Alcohol Ban	−0.180	0.225	0.022	−0.426
	(0.310)	$(0.069)^{***}$	(0.072)	(0.292)
Ban × Post Oct 2016	1.290	0.066	0.322	0.901
	$(0.257)^{***}$	$(0.021)^{***}$	$(0.071)^{***}$	$(0.175)^{***}$
N	3,906	3,906	3,906	3,906
Mean	15	1.1	3.3	10

Note: Each observation is at district-month level. $PostOct2016$ is a dummy that takes value 1 for all districts in Bihar after October 2016, and 0 otherwise. The Bihar state government notified Bihar Prohibition and Excise Act (2016) on October 2, 2016. Model includes district and time fixed effects. Standard errors, in parentheses, are clustered at state-year level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Figure 7: No heterogeneous effects of alcohol prohibition on crime

	(1) Literacy	(2) Female Voter	(3) Alcohol Emp.	(4) Urban Pop
Alcohol Ban	1.204	3.154	1.314	0.279
	(3.091)	(4.783)	(0.710)*	(0.934)
Ban × Baseline Charac.	-0.827	-3.910	-9.207	4.795
	(6.467)	(7.504)	(5.419)	(9.908)
N	3,906	3,906	3,906	3,906
Mean	15	15	15	15

Note: Each observation is at district-month level. The outcome variable is rate of all cognizable crimes (per 100,000 population). In columns (1), (2) and (3), the district characteristic measures the proportion of literate population; percentage of female voters who had cast their ballot in the most recent election (i.e. 2015 in Bihar and 2014 in Jharkhand); and urban population respectively. In column (4), heterogeneity according to the proportion of labor-force employed in food and accommodation sector (a proxy of the alcohol industry) in each district is tested. All district characteristics are cross-sectional, time-invariant indicators measured at baseline (before alcohol ban). Model includes district and time fixed effects. Standard errors, in parentheses, are clustered at state-year level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: Robustness to alternative treatment assignment (neighboring border districts)

	(1) All Cognizable	(2) Violent Crimes	(3) Property Crimes	(4) Other Crimes
Alcohol Ban	1.641	0.164	0.311	1.165
	(0.619)**	(0.072)**	(0.122)**	(0.513)**
N	1,575	1,575	1,575	1,575
Mean	14	.98	3	10

Note: Each observation is at district-month level. The sample has been restricted to only include the 18 border districts, 8 in treatment group (Bihar) and 10 in control group (Jharkhand), for the period January 2013 to March 2018. Model includes district and time fixed effects. Standard errors, in parentheses, are clustered at state-year level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Figure 8: Heterogeneous effects of alcohol prohibition on crime

	(1) All Cognizable	(2) Violent Crimes	(3) Property Crimes	(4) Other Crimes
Panel A: Media				
Alcohol Ban	3.151	0.410	0.777	1.964
	(0.972)***	(0.134)**	(0.326)**	(0.713)**
Ban × Newspaper	-2.917	-0.167	-0.634	-2.116
	(0.907)***	(0.111)	(0.325)*	(0.710)**
Alcohol Ban	2.479	0.319	0.507	1.653
	(0.934)**	(0.105)**	(0.199)**	(0.728)**
Ban × Mobile	-2.866	-0.076	-0.413	-2.378
	(1.198)**	(0.097)	(0.237)	(0.980)**
Panel B: Collective Action				
Alcohol Ban	1.715	0.263	0.615	0.837
	(0.671)**	(0.083)***	(0.168)***	(0.590)
Ban × Self Help Groups	-1.827	0.022	-0.692	-1.157
	(1.077)	(0.076)	(0.158)***	(1.055)
Alcohol Ban	0.882	0.268	0.238	0.376
	(0.508)	(0.077)***	(0.118)*	(0.401)
Ban × *Jeevika*	-0.601	0.043	0.159	-0.802
	(0.349)	(0.033)	(0.112)	(0.260)**
Panel C: Black Market				
Alcohol Ban	0.434	0.308	0.220	-0.094
	(0.548)	(0.078)***	(0.117)*	(0.443)
Ban × Border districts	0.894	-0.085	0.110	0.869
	(0.289)**	(0.030)**	(0.085)	(0.214)***
Alcohol Ban	1.181	0.230	0.105	0.847
	(0.497)**	(0.074)***	(0.136)	(0.399)*
Ban × Above median prices	-0.680	0.076	0.274	-1.031
	(0.188)***	(0.037)*	(0.116)**	(0.166)***
N	3,906	3,906	3,906	3,906
Mean	15	1.1	3.3	10

Note: Each observation is at district-month level. The outcome variable is crime rate (per 100,000 population). Panel A measures media coverage as either percentage of villages in a district that have access to daily newspaper supply or mobile phone. Panel B considers women's participation in self help groups and Bihar's Rural Livelihood Programme as a proxy for collective action. *Jeevika* takes the value 1 for all districts that were covered under project and 0 otherwise. Districts covered under project *Jeevika* include, i.e. Nalanda, Gaya, Muzzafarpur, Madhubani, Purnea and Khagaria. Panel C considers two proxies for black market activities: border vs interior districts and prices of country liquor in rural Bihar in 2016, after the implementation of the alcohol ban. All district characteristics are cross-sectional, time-invariant indicators measured at baseline (before alcohol ban), with the exception of black-market prices which were measured after the ban. Model includes district and time fixed effects. Standard errors, in parentheses, are clustered at state-year level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 6: Robustness to sand mining ban

	(1) All Cognizable	(2) Violent Crimes	(3) Property Crimes	(4) Other Crimes
Alcohol Ban	0.622	0.250	0.124	0.248
	(0.428)	(0.074)***	(0.096)	(0.364)
N	3,339	3,339	3,339	3,339
Mean	13	1.1	2.9	9.5

Note: Each observation is at district-month level. The sample has been restricted to only include 53 districts, 29 in treatment group (Bihar) and 24 in control group (Jharkhand), for the period January 2013 to March 2018. Nine districts from Bihar have been dropped from the original sample, i.e. Saran, Patna, Bhojpur, Supaul, Sheikpura, Begusarai, Lakhisarai, Rohtas and Buxar These 9 districts account for majority of the sand mining activities in the state. Model includes district and time fixed effects. Standard errors, in parentheses, are clustered at state-year level. * p < 0.1, ** p < 0.05, *** p < 0.01.

Table 7: Robustness to North-Bihar floods

	(1) All Cognizable	(2) Violent Crimes	(3) Property Crimes	(4) Other Crimes
Alcohol Ban	1.057	0.292	0.387	0.378
	(0.696)	(0.088)***	(0.191)*	(0.486)
N	2,772	2,772	2,772	2,772
Mean	15	1.2	3.5	11

Note: Each observation is at district-month level. The sample has been restricted and includes only 44 districts, 20 in treatment group (Bihar) and 24 in control group (Jharkhand), for the period January 2013 to March 2018. 18 districts from the North-Bihar region have been dropped, which were severely affected by foods during the sample period. These districts are West Champaran, Gopalganj, East Champaran, Saran, Sheohar, Sitamarhi, Muzzafarpur, Madhubani, Darbhanga, Samastipur, Khagaria, Supaul, Saharsa, Araria, Madhepura, Purnea, Katihar and Kishanganj. Model includes district and time fixed effects. Standard errors, in parentheses, are clustered at state-year level. * p < 0.1, ** p < 0.05, *** p < 0.01.

Table 8: Robustness to alternative specification (outcome variable as log crime)

	(1) All Cognizable	(2) Violent Crimes	(3) Property Crimes	(4) Other Crimes
Alcohol	0.032	0.101	0.013	0.011
	(0.024)	(0.049)*	(0.039)	(0.027)
N	2,772	2,772	2,772	2,771
Mean	5.3	2.7	3.8	5

Note: Each observation is at district-month level. The sample includes 62 districts, 38 in treatment group and 24 in control group, for the period January 2013 to March 2018. The outcome variable in column (1) is natural log of all cognizable crimes (per 100,000 population). Outcome variable in column(2) is natural log of violent crimes. Violent crimes include rape, kidnapping and murder. Outcome variable in column(3) is natural log of property crimes. Property crimes include burglary, dacoity, robbery, theft and riot. Outcome variable for column (4) is narural log of other crimes, which include non-property and non-violent crimes such as wrongful restraint, rash driving and violation of electricity act, arms act, dowry prohibition, etc. Model includes district and time fixed effects. Standard errors, in parentheses, are clustered at state-year level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 9: Robustness to alternative specification (outcome variable as log crime rate)

	(1) All Cognizable	(2) Violent Crimes	(3) Property Crimes	(4) Other Crimes
Alcohol	0.065	0.134	0.046	0.044
	(0.029)**	(0.053)**	(0.040)	(0.031)
N	2,772	2,772	2,772	2,771
Mean	2.6	.025	1.1	2.3

Note: Each observation is at district-month level. The sample includes 62 districts, 38 in treatment group and 24 in control group, for the period January 2013 to March 2018. The outcome variable in column (1) is natural log of rate of all cognizable crimes (per 100,000 population). Outcome variable in column(2) is natural log of rate of violent crimes. Violent crimes include rape, kidnapping and murder. Outcome variable in column(3) is natural log of rate of property crimes. Property crimes include burglary, dacoity, robbery, theft and riot. Outcome variable for column (4) is narural log of rate of other crimes, which include non-property and non-violent crimes such as wrongful restraint, rash driving and violation of electricity act, arms act, dowry prohibition, etc. Model includes district and time fixed effects. Standard errors, in parentheses, are clustered at state-year level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

C   Supplementary Information

C.1   Timeline of Excise Policy in Bihar

1938	Limited regulation of molasses and sugarcane production
1979	Alcohol prohibition announced by Karpoori Thakur but the ban was lifted by successor Ram Sundar Das in the wake of increased corruption and bootlegging
2005 Nov	Regime change in Bihar. Nitish Kumar led coalition of JDU and BJP defeat RJD+INC alliance ending 15 years of rule by Lalu Prasad Yadav
2007 Jul	New excise policy announced
2007-2015	Expansion in licensed alcohol shops in villages (from 3,436 in 2006-07 to 5,467 in 2012-13); excise revenue increases from nearly INR 5 billion in 2007-08 to INR 36 billion in 2014-15
2015 Oct	In response to women's complaints about widespread alcoholism, incumbent chief minister promises to implement alcohol prohibition if his government were to be re-elected to power. "These women are correct about alcohol. If I come to power, I will have it stopped."
2015 Nov	Bihar elections results and policy announcement
2016 Apr	Government legislates Bihar Excise (Amendment) Act, 2016
2016 Oct	Government introduces an updated policy, legislating a new Bihar Prohibition and Excise Act, 2016, after the Patna High Court struck down the April law amendment
2017 Jan	Human chain for spreading awareness about de-addiction and prohibition

Source: Rahman (2004) and various news reports

C.2 Past prohibition polices in Indian states

While many states in India have experimented with an alcohol prohibition policy in the past, the ban is seldom exogenous and rarely comprehensive. In majority of the cases the implementation is limited to only certain geographic regions or some specific types of alcohol. In contrast, the case of Bihar in 2016, alongside availability of granular level crime data at district-month level provides a clean research design for a DiD analysis[2]. The following reasons explain why existing prohibition policies are not suitable for a causal empirical investigation:

- Andhra Pradesh: The Government of Andhra Pradesh introduced and extended prohibition of manufacture, sale and consumption of intoxicating liquors and drugs in the Andhra area of the state in 1937. After a series of amendments, over the period 1955-1995, prohibition was ultimately repealed on all alcohol (except arrack) in 1997. Since the law was introduced in specific areas of the state, endogeneity concerns and possibility of intra-state trading poses substantial threats to identification.

- Kerala: Kerala enforced prohibition across 7 districts (Kozhikode, Palghat, Cannanore, Trivandrum, Quilon, Ernakulam, Trichur) in 1950, but repealed prohibition of all types of alcohol (except arrack) from all local areas in 1967. Data constraints prevent us from studying this policy, since crime data prior to 1971 is only available at the state level (Blakeslee and Fishman, 2017).

- Assam: The Government of Assam prohibited the possession, consumption and manufacture of liquor and smuggling thereof into the Barpeta sub-division and other areas of the state in 1952. In order to fix certain loopholes in the policy, it was later amended in 1963, allowing permits for foreigners and submitted a clarification on what a 'state of drunkenness' entails. However, yet again the ban was lifted from all alcohol in 1994. Yet again, we were limited by data constraints, for data points prior to 1971, to effectively evaluate this policy.

- Karnataka: Further, Karnataka enforced prohibition in selected districts over the period 1938-1961. However, in 1965, it lifted complete prohibition across the state and provided a uniform law relating to production, manufacture, possession, import, export, transport, purchase, and sale of liquor and intoxicating drugs, and the levy of duties of excise. Since the law was implemented in few districts, crime data at the

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[2]Despite our best efforts, the district-month crime data could be accessed only for Bihar and Jharkhand, and not for any other state.

district level would be required to study this policy and this data was only available at the state level for periods prior to 1971.

- Madhya Pradesh: The Government of Madhya Pradesh first enacted prohibition in 1938 in some districts (Sagar, Damch, Narsinghpur, Khandwa, Hoshangabad, Vidisha, Raipur, Bilaspur, Durg, Jabalpur, Bhilsa) and made jail imprisonment compulsory for liquor offenses in 1961. However, the ban was lifted from all areas in 1964. Few districts, for example Jhanbua district, observe self-imposed prohibition. This prohibition was similar to that implemented in Karnataka, Assam and Kerala, limiting the scope to exploit experimental techniques to study the policy.

- Orissa: The Govt. of Orissa was also subject to a series of policy 'flip-flop', where the ban was enforced and repealed twice in the period 1956 to 1995. The Govt. imposed a ban on the entire state, it did so only for one year (1994-1995), prior to which it was limited to certain districts (Cuttack, Balasore, Puri, Ganjam, and Koraput). Since the policy was rolled out in at a statewide level, only for one time period, it provided limited scope to assess this policy, especially since crime data for Odisha is available only year-wise (to our limited knowledge) , unlike the case for Bihar and Jharkhand where we were able to get month-wise crime data.

- Gujarat: While the Government of Gujarat envisioned a complete ban on manufacture, sale and consumption of all liquors (like that in Bihar), the policy was riddled with multiple loopholes (several anecdotal evidences on cross-border trading and poor enforcement), making the prohibition 'incomplete'. Multiple attempts have been made to reinforce complete prohibition ever since (one in 1963 and another in 1977).

- Haryana: Haryana is by far the only state that enforced the prohibition in the same spirit as the Bihar Prohibition and Excise Act, 2016. However, the law was only enforced for one year, making it difficult to study its implications on outcomes such as crime, economic activity or other socio-economic indicators.

Source: Compiled from (Rahman, 2004)