A Micro-Econometric Analysis of Alcohol Prohibition in India

by

Lupin Rahman

Submitted to the Department of Economics, London School of Economics
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Abstract

This thesis contributes to the understanding of alcohol prohibition by examining the causes and effects of prohibition policy in Indian states over 1957-2001.

Chapter 2 examines the political economy of prohibition by using a state-level dataset to estimate the determinants of prohibition legislation. The analysis finds prohibition to be associated with the electoral cycle, legislature identity, lower relative strength of the alcohol industry, and the composition of state finances – in particular the share of central union excise.

Chapter 3 focuses on the impact of prohibition on alcohol consumption using a series of cross sections of the National Sample Survey. Unit value analysis is conducted to estimate the impact on prices by alcohol group and uncover the demand and supply dynamics in the market. The relationship between alcohol, tobacco, and pan is examined using prohibition as an exogenous instrument, and the spill-over effects of policy on the demand for these goods are calculated. Prohibition is estimated to decrease alcohol participation by 26% with the effect varying by alcohol type and extent of prohibition. While both supply and demand shifts drive the decrease in consumption, the evidence suggests the deterrent effect of prohibition is significant. Tobacco and pan are found to be complements to alcohol and prohibition is associated with a fall in their demand.

Chapter 4 focuses on the impact of prohibition on intrahousehold resource allocation by estimating Engel curves for broad categories of expenditure. The results indicate prohibition increased outlays for food and fuel with the magnitude of change being consistent with the reduction in alcohol estimated. The negative private and social effects of alcohol use are also examined. Prohibition led to a decrease in spurious liquor consumption and incidence of burglaries. However, it is associated with an increase in liver disease deaths and homicide rates.

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Bismillah-hir Rahman-nir Rahim

This thesis is dedicated to my parents, Nazma and Mujibur Rahman

"The reign of tears is over. The slums will soon be a memory. We will turn our prisons into factories and our jails into storehouses and corncribs. Men will walk upright now, women will smile and children will laugh. Hell will be forever for rent."

Reverend Billy Sunday speaking at the beginning of Prohibition, 1920.

"Prohibition goes beyond the bounds of reason in that it attempts to control a man's appetite by legislation, and makes a crime out of things that are not crimes."

Abraham Lincoln (1809-1865) 16th US President.

Chapter 1

An Overview of the Thesis

1.1 Introduction

Alcohol prohibition has been a popular and contentious policy tool for curtailing alcohol consumption in both developed and developing nations. As the quotes in the previous page highlight, the spectrum of opinion over prohibition is broad. Prohibitionists argue that alcohol use is associated with significant private and social negative effects which prohibition alone can address. Libetarians and others view prohibition, by restricting individual choice, as being an extreme manifestation of a paternalistic state and the imposition of the puritanical preferences of a few over the rest of society.

This thesis contributes to the debate on prohibition by undertaking an econometric analysis of the determinants and effects of alcohol prohibition in Indian states over 1957-2001. In doing so, it aims to understand what precipitates prohibition policy, particularly whether prohibition is implemented as a response of benevolent governments to market failures and errors in individual decision-making, or to further the goals of self-motivated political agents. The thesis also focuses on the effects of prohibition on alcohol consumption, and examines the spillover effects on demand for addictive and general goods in the household consumption bundle. In addition, the relationships between prohibition and private and social negative effects generally associated with alcohol use are analysed.

The main contribution of this thesis is a systematic empirical analysis of prohibition policy, which provides a basis for the unbiased assessment of the various arguments for and

against alcohol prohibition. This in turn contributes to a better understanding of prohibition policies with respect to their effectiveness in controlling consumption, their spillover effects on other markets, and their impact on alcohol-related negative effects.

The remainder of this chapter is organised as follows. Section 1.2 discusses the historical background of alcohol prohibition and motivates the thesis. Section 1.3 gives an overview of each chapter and is followed by the main results in Section 1.4. A glossary of terms is included at the end of the thesis.

1.2 Background and Motivation

1.2.1 History of Prohibition Policy

The prohibition of *bads* like alcohol and other drugs has had a long and varied history, with prohibition existing, in one form or another, in most societies. In general, prohibition tends to involve the restriction or prevention of the consumption or production of a particular item, although the particular form prohibition takes can vary. For example, prohibition may entail the prevention of the sale, production and consumption of the good in question; it may cover only particular sub-groups of the good such as hard liquor in the case of alcohol prohibition; it may restrict the permitted quantity of consumption; or it may be implemented on a specific section of the population such as persons under a given age.

Prohibition of alcohol in the developed world is associated mainly with the Temperance Movement in the Protestant countries. In the US, prohibition has been present since the 1750s when the consumption and sale of liquor, particularly to slaves and Red Indians, was strongly discouraged. The first US state-level prohibition was passed in Maine in 1851, and by 1855 13 of the 31 states had passed similar laws. This broad trend towards abstinence together with the growth of the Prohibition Movement[1] culminated in National Prohibition of Alcohol in the US over 1920-1933[2]. During the late nineteenth and early twentieth

[1]The Prohibition Movement comprised mainly of the Anti-Saloon League, who viewed alcohol as a vice that would lead to moral degradation if consumption was unchecked, and the Womens' Christian Temperance Union, an alliance of state movements for prohibition who viewed prohibition as part of a wider set of reforms linked to womens' suffrage and electoral reform.

[2]National Prohibition of Alcohol in the US was enacted by the Volstead Act in 1919 which enforced the Eighteenth Amendment to the US Constitution. This was later repealed by the Blaine Act of 1933 with the

century, prohibition was also present in Norway, Sweden, Finland, Russia and Canada[3]. In some countries prohibition was enacted in particular localities. For example, in Scotland citizens were given the right to vote out drinking establishments within their towns and villages after 1920.

The prohibition movement stymied in the 1930s with the onset of the Depression and the lifting of national prohibition in the US. By the Second World War alcohol prohibition legislation had been repealed in most western countries, with prohibition being enforced mainly in local jurisdictions[4]. In the contemporary period, the most notable episode of prohibition occurred in the Soviet Union in the late 1980s during Perestroika. This entailed, President Gorbachev prohibiting the sale and consumption of liquor in an attempt to reduce the high incidence of alcohol related deaths and disease.

In developing countries, prohibition has been traditionally associated with religious preferences and women's welfare groups, similar to the US prohibition movement. Countries with a large proportion of Muslims have tended to have alcohol prohibition due to the ban of any form of alcohol consumption stipulated in Islam. In non-Muslim countries the main impetus tends to be the negative effects associated with alcohol use, in addition to moral considerations derived from religion[5]. In India, which is the country of study for this thesis, prohibition is strongly encouraged in the Constitution, influenced partly from the emphasis placed on abstinence by Gandhi and partly from the religious principles of Hinduism. However, alcohol policy is the jurisdiction of the state, with each state having full control of alcohol legislation, state excise rates and the organization of production and sale of alcohol. In fact, since Independence most states have enacted some form of prohibition resulting in significant variation in the implementation of prohibition policy across states and over time.

Twenty-First Amendment to the US Constitution which lifted national prohibition.

[3]In Sweden, the temperance movement had been strong since the 1830s and after 1922 the government nationalized the alcohol industry and restricted sales to 1 liter per family per week. In Norway, a referendum outlawed the sale of drinks with an alcoholic content of more than 12 percent in 1919 which was subsequently reversed in 1932. The Finnish government banned the sale of any drink of more than 2 percent alcohol in 1932. During World War One, the Tsar in Russia enacted national prohibition against hard liquor including vodka. During the early 20th century Canada was dry in all provinces.

[4]For example, while national prohibition has been lifted in the US, prohibition is still present in some counties of Texas and Salt Lake City,Utah.

[5]For example, Hinduism believes alcohol to be an impurity and thus prohibits the priestly caste from consuming any form of alcohol.

This makes India an optimal choice in studying the causes and effects of prohibition policy while controlling for country-level fixed effects such as a culture of abstinence.

Despite the contentious history of prohibition, it is relatively under-researched in the economics literature, both in terms of the underlying causes which determine it and its impact on consumption and alcohol-related externalities. The substantial social science literature on prohibition, in particular the US National Prohibition, is limited mainly to sociological and political history analysis. This thesis attempts to add to this literature by undertaking an econometric analysis of prohibition and systematically examining its main determinants and consequences. Given the qualitative nature of many of the determinants, the analysis is by design limited and should be viewed as a complement to the sociological and political literature on alcohol prohibition.

Understanding the determinants of prohibition is strongly linked to understanding what drives government policy choices, in particular state regulation and paternalism. The *helping hand* view assumes governments intervene to improve market efficiency in the wake of externalities, missing markets, or errors in individual decision-making abilities. An alternate view takes government regulation as the outcome of opportunistic policy makers aiming to maximise individual welfare. The analysis identifies several factors which are hypothesized to cause prohibition and estimates their relative importance in driving prohibition and their inter-relations. In doing so, it sheds light on what causes governments to regulate and in particular, enact prohibition policies.

The effects of prohibition on alcohol consumption are poorly understood, in part due to a lack of data on alcohol consumption during prohibition periods. The relatively recent[6] experience of prohibition in India allows the use of household surveys which includes alcohol consumption and expenditure variables in prohibition and non-prohibition years across all states. From a theoretical standpoint it is not clear, a priori, whether prohibition affects consumption and, if so, in which direction and through which mechanisms. Temperance movements claim that prohibition reduces consumption by cutting off supply. However, in practise, while the illegal nature of production may reduce supply initially, the availability of large rents for extraction may induce an increase in supply and the growth of black

[6]India has had significant periods of prohibition since Independence in 1947 to the present period.

markets in liquor. Moreover, while the illegal nature of consumption may reduce demand, prohibition may also lead to a "glamorization" of alcohol and hence increase consumption amongst certain groups. In addition to the limited understanding of the direction of effect of prohibition on alcohol consumption, little is known about the mechanism by which prohibition affects demand. If the main channel is through price changes, then taxation is a viable alternative policy tool. On the other hand, prohibition may also affect demand by increasing the fixed costs of consumption due to deterrence effects or the higher cost of acquiring illegal alcohol. In this case, it is not clear that taxation would be able to bring about a similar demand response.

The association between alcohol use, alcohol prohibition and the negative effects associated with alcohol use requires further study. While the effect of taxes on alcohol-related negative effects have been examined in the economics literature, there is limited work on the impact of prohibition on these variables. If the main channel through which policy affects negative outcomes is via reducing alcohol consumption, then prohibition, in so far as it affects consumption, should have a similar effect as taxation. However, prohibition may affect alcohol-related negative outcomes in other ways. With regards to the private health effects of alcohol, prohibition may induce consumption of spurious liquor which has its own associated detrimental effects on health. Prohibition may also give rise to certain types of criminal behaviour on part of the consumer by increasing the cost of alcohol consumption and thereby lowering the relative risk of crime. There may also be effects on organised crime as its expands to control black markets in liquor or offer enforcement services to bootleggers in the absence of state regulation. Aside from these, prohibition may have wider implications for society by fostering a culture of hypocrisy and disregard for the law. This is captured in Al Capone's famous quote: "When I sell liquor, it's called bootlegging; when my patrons serve it on Lake Shore Drive, it's called hospitality".

Understanding the determinants and consequences of prohibition is therefore important as it is not clear, a priori, what these actually are. In addition, there is limited empirical work on how effective a tool prohibition is for alcohol control, which is imperative in assessing the trade-off of individual rights given that prohibition is an extreme form of paternalism. This is particularly important as prohibition is associated with certain costs such as the

loss of tax revenue form alcohol, the possible increase in black markets and organised crime, higher risk of corruption of law enforcement agents and politicians, and greater risk of alcohol-related health problems as individuals consume illegal liquor. Finally, the study of alcohol prohibition may shed light on understanding what drives prohibition of other goods such as opium, cocaine, and marijuana and how effective a strategy it is to curtail their demand.

1.2.2 Prohibition and Other Policy Tools

Traditional policy tools to reduce alcohol consumption include measures to affect price directly such as taxation; or legal enactments to prevent consumption such as prohibition, which have a more indirect effect on the implicit price. The most common methods have been taxation, minimum age requirements, and restrictions on drinking hours. Aside from preferences for paternalism, the choice of prohibition versus other policy levers depends on various factors including patterns of alcohol consumption and the efficacy of each tool in attaining the desired level of consumption. The argument for prohibition versus other policy levels is therefore not clear cut, particularly as there is substantial evidence linking alcohol taxation with alcohol consumption and the negative effects of alcohol use. Taxation may have a limited impact on price when the demand function is price inelastic, which may be the case at the mean or for particular segments of the curve like for alcoholics. Policy choice will also depend on the type of alcohol predominantly consumed, which in itself may affect elasticities, and the drinking culture for example, whether the emphasis is on intoxication as opposed to enjoying the taste of the beverage. In addition, taxation may be ineffective in affecting alcohol price in economies with under-developed taxation systems and poor institutional environments. In such settings, prohibition may be more effective in reducing alcohol consumption and be a more feasible policy to implement. Finally, prohibition may be more effective if consumption in the whole of the population versus a subset is being curtailed.

Prohibition may be a more effective policy tool relative to taxation, if the policy objective is to drastically reduce alcohol consumption as opposed to influencing consumption choices at the margin. This may occur if policy-makers, and society at large, believe alcohol use

is intrinsically wrong due to, for example, moral considerations or religious preferences. In fact the early history of prohibition in the Protestant countries was driven largely by such factors, particularly the view that elite groups in society were better equipped to decide about moral choices for the uneducated, uncivilised masses[7]. Prohibition may also arise if the associated negative externalities are sufficiently large in scale or extreme in nature such that the trade-off of consumption is considered a small price to pay. This is an important reason why alcohol may be subject to greater calls for prohibition relative to other addictive goods such as cigarettes. The main spillovers associated with alcohol are motor vehicle accidents and first-degree crimes such as murder, assault and rape. As such, these are regarded as more detrimental and harder to contain than the negative effects of smoking, which is mainly associated with private harm.

Aside from the possible relative efficacy of prohibition versus taxes, prohibition may be enacted due to its alleged association with specific positive side effects. Women's movements against liquor have argued that prohibition shifts the power balance within the household by enabling women to have greater say in the allocation of household resources. This, it is argued, increases household welfare as consumption of essentials increases and resources are directed to child-related items. Prohibitionists have also claimed that, in addition to lowering crime and alcohol-related externalities through its effects on consumption, prohibition has additional effects on crime and violence. In particular, it limits the power of the local mafia by drastically limiting the power of liquor barons, who are linked with the criminal underworld and organised crime.

1.3 Description of Thesis

This thesis aims to contribute to the economic understanding of the determinants and effects of prohibition policy. In particular it focuses on the effects of prohibition on alcohol consumption, the demand for economic bads, and the intrahousehold allocation of resources. The analysis also examines the impact of prohibition on private and social negative effects

[7] As noted above prohibition in the US first began with the restriction of consumption for slaves. To some extent the impetus behind partial prohibition in India, where arrack - the drink of the working poor - is prohibited may reflect such tendencies.

associated with alcohol use. The country of focus is India, which has significant variation in prohibition policy across states and over time. This together with a rich source of data on alcohol consumption, during both prohibition and non-prohibition periods, makes India an optimal choice for studying prohibition policy.

Paternalistic policies, such as alcohol prohibition, have been a feature of most governments throughout time. Despite this, there is little econometric literature on what drives paternalism, both across states and with respect to the focus of government regulation. Chapter 2 contributes to this literature by examining the determinants of prohibition policy. As noted above, prohibition has had significant support in several countries, yet little is known about what factors are important in bringing about prohibition policy. The analysis focuses on whether governments enact prohibition in order to correct market failures or whether the role of the state in the economy is less benign and serves to fulfil the objectives of politicians and bureaucrats.

The measure of prohibition used is compiled from State Local Acts on prohibition policy and therefore captures legislated, as opposed to enforced, prohibition. There have been several types of prohibition enacted in India including complete prohibition and partial prohibition. Complete prohibition of alcohol is when production, sale, and consumption of any alcohol is restricted, while partial prohibition is when specific alcohol types are prohibited. In the case of the latter, the alcohol in question is usually arrack (the local distilled brew) or toddy (the local home brew). Legislated prohibition is measured in terms of the proportion of population under prohibition as in the period up to the 1970s, prohibition was enforced on particular districts and not across the whole state. After the 1970s prohibition tended to be enacted across the whole state and the variable is effectively a dummy variable.

The econometric strategy specifies legislated prohibition as a function of political economy variables including the timing of the electoral cycle, proportion of seats in the state parliament by political party grouping, political competition, and the sex and caste of legislatures. Next, the effect of the alcohol industry is analysed to assess the power of lobbying in influencing prohibition. This together with the analysis of state finances and the proportion of other states enacting prohibition sheds light on whether states use prohibition

to compete with each other for central resources. The effect of mimicry is examined by including measures of the proportion of states at the All-India level that have enacted prohibition in the previous period. The last set of variables examines the association between the negative private and social effects of alcohol consumption and prohibition policy to infer whether there is any basis for the helping hand view of government regulation. The results from this exercise are extended to examine the inter-relationships between the estimated determinants of prohibition, understand the impetus behind prohibition policies, and assess the evidence for the two main theories of regulation.

Chapter 3 assesses the impact of alcohol prohibition on alcohol consumption by type of alcohol and adds to the significant economic literature on alcohol demand and the impact of policy in curtailing demand. Alcohol prohibition is modelled as increasing both the fixed costs of consumption and the consumer price in a static model of household demand. The analysis first examines the determinants of alcohol budget shares in Indian households by controlling for household per capita expenditure, household size, caste, sectoral location, and the sex, age, literacy, marital status and occupation of the household head. The empirical effect on alcohol participation and the magnitude of demand is then estimated using a Heckman selection model of alcohol quantity and budget shares controlling for a large set of household characteristics. The effects on the supply side and, in particular, producer prices are inferred through a careful analysis of the effect of prohibition on alcohol unit values. Robustness of the results from these two analyses are checked by decomposing the effect of total alcohol by type and examining the cross-demand effects between alcohol groups. The significant variation afforded by Indian state prohibition policy and its correlation with alcohol provides a useful instrument to examine the relationship between alcohol and other "bads" such as leaf tobacco, cigarettes, bidis, and pan. The nature of this relationship is important to assess the magnitude and nature of spill-over effects of alcohol policy, and provide some insight on how consumption of these items can also be curtailed.

The analysis in Chapter 3 improves our understanding of alternative alcohol policy handles, while the developing country focus expands the empirical literature beyond economies with well-functioning markets and institutions. Its main contribution is a systematic analysis of prohibition policy using household data on consumption which mitigates data problems

faced by other studies of prohibition. The analysis also adds to the body of work assessing the nature of demand functions for alcohol, tobacco, and pan and their inter-relationships in developing country settings. In doing so, it offers insight into the spillover effects of alcohol policies on these markets.

The relationship between alcohol consumption and other variables is further explored in Chapter 4. This chapter examines the effect of alcohol prohibition in India on indicators of negative private and social effects of alcohol use and the intrahousehold allocation of resources. In doing so, it goes some way to test prohibitionists' claims that alcohol prohibition improves social welfare by reducing the negative consequences of alcohol consumption. The analysis first examines detailed information on the intrahousehold allocation of resources to ascertain whether prohibition resulted in an increase in the consumption of other household items, and if so which particular groups of items. Particular emphasis is given on child- and sex-specific goods to ascertain whether prohibition differentially affects consumption for particular household members. In order to tackle endogeneity concerns, the effect of prohibition on alcohol for particular groups of households are examined together with the effects on other household consumption items. This is to show that households with higher consumption of alcohol were differentially affected by prohibition and in turn show differential effects on intrahousehold allocations.

The private negative effects of alcohol are studied by examining rates of alcohol-related illnesses such as treatment of liver-diseases, and alcohol-related deaths including deaths from liver-disease, liver cirrhosis, spurious liquor, poisoning, and general accidents. The effect of prohibition on alcohol-related social externalities are inferred by examining road accident fatalities and crime rates by type of crime including murder, rape, burglary, robbery, theft and dacoity.

1.4 Results and Contribution

The primary contribution of this thesis is a better understanding of the empirical determinants of prohibition policy and the estimatible effects on alcohol consumption.

The analysis in Chapter 2 finds limited support for the helping hand view of government

regulation and finds evidence which suggests paternalism, in the form of alcohol prohibition, is politically motivated and serves the objectives of opportunistic government agents. The results show that prohibition is unrelated to the negative private and social effects of alcohol consumption or efficiency of the tax system. Instead prohibition is positively related to the electoral cycle suggesting that political economy considerations play an important role in its enactment. There is strong evidence that the size of the alcohol industry negatively affects prohibition as implied by theories of lobby power and regulatory capture. Furthermore, the financial capacity of the state government, in particular its dependence on alcohol-related receipts and ability to elicit central transfers, is a key factor in determining prohibition. There is no association with party identity, characteristics of the electorate, or political competition but a strong association with the caste and sex of the legislature. This implies that prohibition policies do not reflect party or voter preferences for paternalism but that of legislatures, preferred constituents, or lobby groups.

Together, these results suggest that prohibition may be determined by tendencies to extract rent from central governments by non-alcohol producing states with large rural populations. In particular, it appears that prohibition is used as a vote-winning strategy to coalesce voters against alcohol producing states with the promise of improved health, welfare, and higher central transfers. The results also indicate limited support for the view that governments pursue paternalistic policies to correct market failures or errors in rational decision-making. Rather they provide grounds for a more opportunistic view of governments where regulation, and in turn, paternalistic policies, are pursued to fulfil the objectives of politicians and bureaucrats.

The descriptive analyses of alcohol consumption patterns in Chapter 3 find that alcohol participation varies by household characteristics with most households consuming a particular type of alcohol. There is also significant variation across states and rural and urban households. Engel curve analysis finds that alcohol is a normal good with the expenditure elasticity of participation varying by alcohol type. However, the expenditure elasticity of alcohol budget shares is negative, which suggests that among households who consume alcohol, proportionate increases in income result in less than proportionate increases in alcohol budget shares.

Overall, rural and landed households have a greater preference for alcohol. Alcohol participation is, in general, significantly lower in female-headed households and in households with a higher proportion of females. It is also lower for households headed by older individuals, but significantly higher in households with married heads. Literate household heads drink less of the traditional liquor types like arrack, but have a strong preference for factory produced distilled liquor like IMFL. Scheduled caste and scheduled tribe households are more likely to consume all alcohol types relative to general castes. This may be because as members of the lower castes in the caste system they are less bound by the Hindu principles of temperance which are most strictly enforced on the priestly (Brahmins) and higher castes. The pattern of alcohol consumption also varies across occupation of the household head with all occupations, except for service workers, consuming significantly less alcohol than labourers.

The effect of prohibition on alcohol demand differs by the type of policy enacted (partial versus complete prohibition) and the alcohol type in question. Overall, complete and partial prohibition decreased alcohol participation by 26% with the greatest effects on arrack in both cases. Unit value analysis shows that complete prohibition significantly decreased alcohol unit values, while partial prohibition significantly increased them. The reduction in consumption during complete prohibition therefore resulted mainly from the deterrent effect of prohibition on demand although supply shifts also occurred. During periods when only one type of alcohol is prohibited, supply shifts are the dominant mechanism in reducing alcohol participation. While total alcohol participation decreased, prohibition increased consumption for certain types of liquor which are more likely to be home-brewed like toddy. Partial prohibition also increased alcohol demand for non-prohibited close substitutes.

The use of prohibition to identify the relationship between addictive goods finds that alcohol and tobacco, and alcohol and pan are complements. However, the relationship varies between disaggregated tobacco and alcohol items. The positive relationship also holds for bidis and leaf tobacco but not for cigarettes which is strongly negatively associated with all types of alcohol participation. Prohibition policy therefore had spillover effects on the demand for these goods, with complete and partial prohibition significantly decreasing participation in total tobacco and pan consumption as expected given their complementary

relationship to alcohol[8].

There has been limited econometric work on the effects of alcohol consumption and policy on negative private and social harm, in the context of India's experience with alcohol. Chapter 4 contributes to this literature by undertaking an econometric analysis of the effects of prohibition on the intrahousehold allocation of resources and the negative consequences of alcohol use. The main results from the econometric analysis on intrahousehold allocations are that prohibition had statistically significant effects, both positive and negative, on household expenditure patterns. Prohibition significantly increased food and fuel budget shares, the former mainly due to increases in consumption of pulses, fruits and vegetables, and dairy products. It also shifted resources towards amusement services, perhaps as a substitution for alcohol. On the other hand, prohibition decreased budget shares of education goods, household appliances and utensils, and household toiletries. These broad effects hold for child and sex-specific goods. Prohibition increased shares of baby food and milk but decreased child education expenditures. The allocation of resources does not follow sex-lines with both male and female clothing increasing and sex-specific toiletries decreasing. The estimated effects of prohibition on intrahousehold resource allocations are small on average, as expected given the small share of alcohol in the household budget.

Given that prohibition had an impact on other household consumption and the varied direction of the effect, underreporting, in the sense that items are declared missing or less than actually spent, is not endemic in driving the results. The incentive for underreporting related to prohibition in household consumption-expenditure surveys is limited but its absence cannot be guaranteed. With respect to the endogeneity of prohibition policy, the interactions with household characteristics indicate that the estimated changes in the consumption bundle are being driven by changes in alcohol consumption due to prohibition rather than vice versa. In addition, they lend support to the argument of limited spurious correlation as prohibition policy appears to have impacted household expenditures most in households consuming alcohol.

[8] Across tobacco types, prohibition increased bidi participation and decreased leaf tobacco consumption by approximately 26%. It also increased cigarette consumption by 8%. The impact of partial prohibition was to decrease tobacco participation by 18%, mainly by decreasing leaf tobacco consumption by 34%. The effect of complete and partial prohibition on pan was to significantly reduce participation by 12% and 28% respectively.

The private negative effects of alcohol are studied by examining rates of alcohol-related illnesses such as treatment of liver-diseases, and alcohol-related deaths including deaths from liver-disease, liver cirrhosis, spurious liquor, poisoning, and general accidents. The analysis finds that prohibition in the early 1960s and 1970s is associated with a significant increase in liver disease deaths; while from the 1980s onwards it is associated with a significant decrease in spurious liquor and liver cirrhosis deaths. Social externalities examined include road accident fatalities and crime rates by type of crime including murder, rape, burglary, robbery, theft and dacoity. While prohibition reduced total crime by reducing the number of burglaries, it also increased the homicide rate significantly. Prohibition was found not to have any impact on road accident fatalities.

Taken together the main contribution of this thesis is a more nuanced understanding of prohibition policy. Prohibition in India was not driven by market failure considerations but used as a political tool to further the ends of political agents. In particular, the evidence suggests prohibition is driven by the relative size of the alcohol industry, and the ability for central-revenue rent extraction by state governments. While prohibition did have large effects in curtailing alcohol consumption and increasing the budget share of food and fuel, it increases the consumption of particular types of liquor and of substitutes to alcohol like cigarettes. The fact that consumption of alcohol does not decrease to zero, indicates the presence of black markets during prohibition which can have negative effects on crime and law enforcement. This is reflected in the increase in homicide rates during prohibition. The positive consumption also implies a higher risk of drinking spurious liquor and encountering serious liver problems which increased during prohibition periods. Overall the findings therefore suggest that while prohibition may have significant positive effects, it may also be associated with negative side-effects and should therefore not be seen as a panacea to the problems induced by alcohol use.

Chapter 2

The Determinants of Government Paternalism: A Study of Alcohol Prohibition in India

"Government exists to protect us from each other. Where government has gone beyond its limits is in deciding to protect us from ourselves."

Ronald Reagan, (1911-2004) 40th US President

2.1 Introduction

Understanding what causes governments to regulate economic activity is important in assessing the optimal role of the state in the economy. Of particular importance is the regulation of individual behaviour via paternalistic policies which constrain consumer sovereignty by forcing, or preventing, choices for the individuals' own good (Camerer et al (2003)). Paternalistic policies to influence demand are valid from an economists' point of view if consumption results in externalities in the form of antisocial behaviour or increased health care costs, or are the result of erroneous decision-making processes either due to bounded rationality or self-control problems[1]. The existing literature on government paternalism has

[1] Recent research in behavioral economics has identified a variety of decision-making errors. These studies conclude that individuals realistically display bounded rationality, bounded willpower, bounded self-interest,

focused mainly on the rationale for policy and the design of interventions to limit the infringement of individual choice. There has also been extensive work on the effectiveness of particular paternalistic policies for example, the effect of taxation in reducing demand for "bads" such as alcohol and cigarettes. However, there is limited work on the determinants of paternalism from a political economy perspective, in particular what motivates governments to pursue such policies. This chapter adds to the empirical literature on paternalism and government regulation by examining the determinants of a relatively under-researched type of paternalism - prohibition of alcohol in India. In particular, the analysis focuses on whether governments regulate in order to correct market failures or whether the role of the state in the economy is less benign and serves to fulfil the objectives of politicians and bureaucrats. The analysis finds limited support for the *helping hand* view of government regulation and finds evidence which suggests paternalism, in the form of alcohol prohibition, is politically motivated and serves the objectives of opportunistic government agents.

Alcohol prohibition is an interesting policy to examine for several reasons. Firstly, prohibition, by *preventing* consumption, lies at one end of the paternalistic policy spectrum. Therefore, whether it is effective is imperative in assessing the trade-off of individual rights. Secondly, prohibition has had significant periodic support in some countries (most notably in the 1930s in the United States) but is relatively under-researched, both in terms of its impact on consumption and alcohol-related externalities, and on the underlying causes which determine it. While the former is important, and is the subject of the next Chapter, understanding the factors which precipitate prohibition may shed light on how effective and efficient a strategy it is for alcohol control, particularly as prohibition comes with certain economic costs. These include the significant loss of state excise revenue[2], expansion of illegal production and smuggling, and higher probability of spurious liquor consumption. Thirdly, prohibition may be a suitable alternative policy handle in economies with underdeveloped taxation systems and poor institutional environments, or where alcohol demand is inelastic such that taxation does not affect alcohol consumption. Finally, the study of

and frequently fail to maximize their expected utility (Camerer et al (2003); Jolls et al (2001); Korobkin and Uleh (2000)).

[2]This results in sharp falls in government finances which, if unstemmed, have drastic effects on other elements of government expenditure.

alcohol prohibition may shed light on understanding what drives prohibition of other goods such as opium, cocaine, and marijuana and how effective a strategy it is to curtail their demand.

The analysis in this chapter examines alcohol prohibition policy in Indian states over 1957-2001. The focus on India is motivated by the emphasis placed on prohibition by state governments to control alcohol demand and the alarming increase in adult per capita alcohol consumption of 115% between 1980 and 2001[3]. Prohibition policy in India is strongly encouraged in the Constitution, influenced partly from the emphasis placed on abstinence by Gandhi[4], a key proponent of prohibition, and the religious principles of Hinduism[5]. However, alcohol policy is the jurisdiction of the state with each state having full control of alcohol legislation, state excise rates and the organization of production and sale of alcohol. There is thus significant variation in the implementation of prohibition policy across states and over time within states as illustrated in Figure 2.1. This cross-sectional variation afforded by Indian states makes it an optimal choice in studying the causes and effects of prohibition policy while controlling for country-level fixed effects such as a culture of abstinence and a predisposition towards large government. In addition, the relatively long time-period of analysis enables the identification of the long-term determinants of prohibition policy.

The results show that similar factors determine the main types of prohibition enacted in India. In particular, prohibition is unrelated to the negative private and social effects of alcohol consumption or efficiency of the tax system. Instead prohibition is positively related to the electoral cycle suggesting that political economy considerations play an important role in its enactment. In addition, it tends to occur in states with high rural population shares. There is strong evidence that the size of the alcohol industry negatively affects prohibition as implied by theories of lobby power and regulatory capture. Furthermore, the financial capacity of the state government, in particular its dependence on alcohol-related

[3]WHO Alcohol Database.

[4]According to Gandhi "Drugs and drinks are two arms of the devil with which he strikes his helpless slaves into stupefaction and intoxication". (Abraham (1995)).

[5]The Hindu scriptures generally disapprove of alcohol consumption but seem to condone its occasional use by certain classes of people such as kings, nobles, warriors, and manual workers. It prohibits its use for priests, students and those seriously following a religious way of life.

receipts and ability to illicit central transfers, is found to be a key factor in determining prohibition. There is no association with party identity, characteristics of the electorate, or political competition but a strong association with the caste and sex of the legislature. This implies that prohibition policies do not reflect party or voter preferences for paternalism but that of legislatures, preferred constituents, or lobby groups.

Together, these results suggest that prohibition is used as a strategy to extract rents from the central governments by non-alcohol producing states with large rural populations. Prohibition is therefore used as a vote-winning strategy by politicians to coalesce voters against alcohol producing states with the promise of improved health, welfare, and higher central transfers. This finding corroborates research on the effect of partisan politics on intergovernmental transfers (Khemani (2003a); Khemani (2003b)) and adds to it by showing that the ambiguity of such transfers often results in strategic state policies. The results also indicate limited support for the view that governments pursue paternalistic policies to correct market failures or errors in rational decision-making. Rather they provide grounds for a more opportunistic view of governments where regulation, and in turn, paternalistic policies, are pursued to fulfil the objectives of politicians and bureaucrats.

This chapter proceeds as follows: Section 2 provides the background to prohibition policy in India and discusses the pattern of alcohol production and consumption in India. Section 3 discusses the methodological framework and econometric strategy. The results are discussed in Section 4 and analysed in Section 5. Section 6 concludes.

2.2 Background

2.2.1 Prohibition Policy in India

The 1949 Indian Constitution granted Indian states complete control of alcohol policy with respect to the taxation of alcohol, the structure and regulation of the alcohol industry, and the prohibition of production and consumption. Particular emphasis was given to prohibition in Article 47 of the Directive Principles of State Policy which states:

"The state shall regard the raising of the level of nutrition and standard of living of its people as among its primary duties and, in particular, the state shall endeavour to bring

about prohibition of the use except for medicinal purposes of intoxicating drinks and of drugs which are injurious to health."

Despite the central ideological stance on prohibition, the transfer of responsibility from the federal to state entities gave rise to significant variation in prohibition across, and within, states over time. Appendix 1 lists State Local Acts enacting prohibition over 1957-2001 in the 16 major states studied in this paper. There are three main types of prohibition policy: complete prohibition of production and consumption of all alcohol types; partial prohibition where a subset of liquor (usually arrack or toddy) is prohibited; and dry days where consumption is prohibited for certain days of the week or month. Legislation is broadly similar across states with prohibition enacted on both production and consumption. However, enforcement focuses mainly on producers who are subject to more severe penalties than consumers[6].

The analysis focuses on the determinants of prohibition as defined by the passage of legislation as opposed to the actual enforced level of prohibition. Legislation is the correct variable to focus on as the vast majority of prohibition in India is imposed by the state as opposed to self-imposed which is limited to selected villages and blocks. Legislation and enforcement may diverge as a government may enact prohibition but not deploy sufficient resources to enforce it due to a lack of funds or simply because prohibition was a hollow act to fulfil election promises. Furthermore, once legislation is in place, legislatures may be more likely to revert effective, as opposed to ineffective, prohibition legislation if it runs counter to their ideology or the interests of associated lobby groups. Consequently estimates from legislated prohibition will be a lower bound to estimates from actual prohibition and will be downwards biased.

Prohibition is measured as the proportion of population under prohibition within a given state and year compiled from enacted state legislation[7]. A proportion was used as, before 1970, prohibition policy was not implemented uniformly within states but was district-, and in some cases block-, specific. However, the decision-making process with regards to

[6] For example, in Kerala during prohibition, production of liquor was subject to at least 6 months imprisonment or a fine of Rs1000, while consumption of liquor was subject to at least three months imprisonment or a fine of Rs500.

[7] The proportion of area under prohibition was also used as a further check.

legislation occurred at the state level with state legislatures putting forward, debating and voting on prohibition bills. This makes it reasonable to use state-level variables as the main explanatory variables for determining prohibition policy. Three measures of prohibition are examined: complete prohibition, all periods of arrack prohibition, and partial prohibition[8]. In order to assess whether prohibition across the state is driven by different factors to prohibition in selected parts of the state, the analysis was repeated using a dummy variable for periods of each prohibition type across the whole state. Results are reported only for proportion of population under complete prohibition with the other results being discussed if different.

Figures 2.1 and 2.2 illustrate the significant variation in prohibition across states over the sample period. The time-line reflects the central emphasis on prohibition in the pre-, and immediate post-, Independence era. This was stemmed by the mid-1960s when several states with long-standing prohibition policies lifted prohibition orders. Since then there has been no sustained central effort to encourage prohibition, except for complete prohibition imposed during the National Emergency of 1977-78[9]. The incidence of complete and partial prohibition across the sample is 23% and 9% respectively (Table 2.1). Complete prohibition periods last, on average, 6.4 years and partial prohibition for 1.5 years. Aside from Gujarat, which has had complete prohibition since Independence[10], complete prohibition policies have been concentrated in the Central and Southern states[11]. Partial prohibition typically has occurred preceding or following complete prohibition and has also been concentrated in the Southern States.

[8] Partial prohibition periods are mainly years when arrack was prohibited but there was not complete prohibition of other alcohol types. In a small number of cases partial prohibition includes periods of toddy prohibition.

[9] This was due to the influence of Prime Minister Morarji Desai - a key proponent of prohibition (Vyasulu (1998)). It is only since trade liberalization in 1992/93 that the negative attitude of the central government towards alcohol has really changed. Since then, growing pressures from the alcohol industry has resulted in the relaxation of restrictions on production quotas, capacity utilization, raw materials (molasses versus grain), and market structure.

[10] Interestingly, Gujarat is the birth place of Gandhi.

[11] Central States with prohibition policies include Haryana and Orissa; Southern states include Tamil Nadu, Kerala, and Andhra Pradesh.

2.2.2 Alcohol Production and Consumption

Historically, the alcohol industry in India has been concentrated in six states—Maharashtra, Uttar Pradesh, Karnataka, Andhra Pradesh, Madhya Pradesh, and West Bengal. Together these states produce the majority of alcohol consumed in India[12]. The location of industry is strongly influenced by the availability of raw materials for alcohol production (molasses, grain and sugar cane) aside from the extent of government regulation of the alcohol sector, which is also an important factor. The industry comprises of three distinct components related to the production, packaging, and retail sale of alcohol. Distilleries and breweries, and bottling and labelling plants tend to be located together, often near urban centres. Retail outlets for the distribution of alcohol typically take the form of liquor shops, where bottled alcohol can be purchased, and bars, where alcohol is served. These are dispersed geographically across all Indian states and not confined to alcohol producing states.

Alcohol consumption does not appear to be systematically related to alcohol production. Data on consumption rates for the entire sample period is limited and hence the extent of the relationship is examined over 1983-2000. Figures reported in Chapter 3 from the National Sample Survey, a large consumer-expenditure household survey, suggest that consumption rates[13] do not track production patterns across states. The Spearman rank correlation between reported participation and industry size is low (-0.006) and the null hypothesis of independence cannot be rejected. Furthermore, industry size is insignificant in determining alcohol participation in reduced-form estimates of alcohol industry on reported alcohol consumption. These results also hold for the four alcohol sub-groups for which data was available[14]. This is corroborated by evidence from government studies, which highlight that consumption is related, not to the level of production within a state, but to the number of retails shops[15]. They cite that while Uttar Pradesh produces more alcohol relative to the Punjab, Orissa, and Haryana, the recorded level of consumption is significantly lower.

[12] International Wine and Spirits Record (2000).

[13] See Table 3.2 of Chapter 3.

[14] These are reported arrack, IMFL, toddy and beer participation. Spearman correlations for participation of each with respect to the alcohol industry are: arrack (-0.077), IMFL (0.306), toddy (0.303), and beer (0.338). For all the null hypothesis of independent variables could not be rejected.

[15] See, for example, the "Report of the Committee for Examining the Issues Related to Auction System of Country Liquor Shops", Government of Maharashtra (1988).

The corresponding figures for reported consumption are 6% for Uttar Pradesh compared to 17%, 13% and 11% in Punjab, Orissa, and Haryana[16].

2.3 Methodological Framework

2.3.1 Theories of Government Regulation

The economic literature contains two main theories of government regulation which can be applied to analyse the determinants of prohibition policy – the *helping hand* view (Pigou (1938)) and the *grabbing hand* view (Tullock (1967); Stigler (1971); Peltzman (1976); Shleifer and Vishny (1998))[17]. The helping hand view postulates that government regulation is the reaction of an efficiency optimizing government to market failures arising in unregulated markets. Applied to alcohol control policies, this view holds that governments curtail alcohol demand due to the negative externalities of alcohol consumption. These imply that consumers optimizing individual welfare overconsume and cannot attain the socially optimal level of consumption. This view also implies that regulation may ensue if there are errors in individual decision-making, due to bounded rationality or problems of self-control, such that individuals are unable to choose the optimal level of consumption themselves.

Within this framework prohibition policies would be pursued if these problems are sufficiently large, or if they are unaffected by taxation or other less restrictive policies such as minimum age requirements. Prohibition should therefore be observed when the negative effects of alcohol consumption, both private and social, are high. The former includes greater incidence of alcohol-related illnesses, deaths from alcoholism, and problems of spurious liquor consumption. The latter includes direct externalities, such as high crime rates and motor vehicle accidents caused by drunk driving, as well as indirect effects such as increases in tax burdens due to higher costs of treating alcohol-related diseases or an increase in insurance premiums due to increased incidence of motor vehicle accidents. Prohibition may also be enacted in the absence of irrational individual decision-making if tax systems

[16] Derived from the data in Chapter 3.
[17] Djankov et al (2002).

are weak so as not to be able to directly affect alcohol demand, even at high marginal tax rates. If this were to hold, we would observe prohibition in states and periods with relatively weak taxation regimes.

The grabbing hand view holds that regulation is socially inefficient and that the government's objective function includes other elements aside from optimizing efficiency. There are two main variants – Stigler's (1971) theory of *regulatory capture*, and the *tollbooth view* (McChesney (1987); De Soto (1990); Shleifer and Vishny (1998)). The theory of regulatory capture contends that "regulation is acquired by the industry and is designed and operated primarily for its benefit" – i.e. industry incumbents acquire regulations to create artificial barriers to entry which reduces competition and increases rents to the detriment of consumers[18]. With respect to prohibition, if regulatory capture is viewed as the ability to escape regulation, we should observe prohibition occurring in states and during periods when the alcohol industry is relatively small[19]. Regulatory capture may also manifest itself in the form of the alcohol industry lobbying for the restriction of specific alcohol types not produced by large distilleries.

The tollbooth view asserts that regulation is pursued for the benefit of politicians and bureaucrats and not necessarily to increase market efficiency. In particular Djankov et al (2002) state that "Politicians use regulation both to create rents and to extract them through campaign contributions, votes, and bribes". Taken together with the broader political economy literature, this suggests that politicians may propose prohibition policies in order to win political favour by reflecting the preferences of the electorate, preferred constituencies, political parties, or of popular social movements such as women's movements against drinking[20]. We should therefore expect to observe prohibition being enacted shortly after elections and possibly be related to the party identity of politicians. If one assumes Besley and Coate's (1997a) citizen-candidate model of the political process, we would also

[18]The alcohol industry in India is subject to a vast amount of state regulation, even in the relatively liberal states. These range from officially set production quotas, lengthy and strict procedures for the issuance of producer licenses, complex regulations on pricing and the mechanism of alcohol delivery (for example bottles versus sachets), and at the extreme, the production of alcohol by state-owned breweries.

[19]This is not a sufficient condition for regulatory capture to hold as a negative relationship may also exist if, for example, states chose to regulate the industry via taxation rather than prohibition.

[20]The most well known of these is the Anti-Arrack Movement in Andhra Pradesh which was spearheaded by women's groups in the Telangana area (Reddy and Patnaik (1993); Kumari and Salaam (1997)).

expect prohibition to be related to characteristics of politicians.

Policy-makers may also pursue prohibition due to rent-seeking activities such as payoffs from lobby groups[21] or preferences for bureaucratic "empire building"[22]. The former would imply a negative relationship between the strength of the alcohol industry and prohibition as per the regulatory capture prediction. Empire-building may result in prohibition if bureaucrats seek to create "Prohibition Departments" or expand the scope and size of the police force. In fact, the qualitative evidence suggests that Prohibition Departments tend to exist long after the end of prohibition. This inertia results in strong incentives for bureaucrats to increase the size of government via policies like prohibition which are often short-lived.

The enactment of prohibition may be conditional on several other variables. Specifically, prohibition (and the type enacted) may depend on the ability of State Treasuries to withstand the fall in state excise revenue without jeopardizing other elements of government expenditure. An important factor in determining this is the relationship of the state with the centre and its ability to elicit centre-state transfers. For example, non-alcohol producing states may enact prohibition policies as the financial constraint of lower state excise is not binding for them, and as it may enable them to receive more centre-state transfers. In addition, as prohibition effectively closes markets for alcohol in non-producing states, it reduces state excise revenues of the producing states.

Prohibition enactment may also depend on its perceived efficiency or popularity. If more states enact prohibition legislation there may be increased impetus for prohibition as individual preferences change or its actual effectiveness/inefficiency is witnessed. On the other hand, the relative gains from prohibition may also shift as more states enact alcohol controlling policies. If the latter induces the alcohol industry to move to non-prohibition states, the marginal benefit of prohibition versus taxation decreases. In addition, if prohibition is related to central extraction, as more states enact prohibition, the marginal benefit from prohibition decreases as the magnitude of the rent left to extract falls. On the

[21] It may also be the case that prohibition is used as retaliation by politicians against alcohol producers who refused to pay bribes.

[22] Note that the grabbing hand view does not necessary imply inefficiency. Rather the creation of rents for bureaucrats and politicians leads to inefficiency due to bureaucratic red-tape and because pursued policies to create rents are distortionary (Djankov el al (2002)).

other hand, as the relative share of central rents fall more prohibition may ensue as states compete to maintain existing central transfer shares.

2.3.2 Econometric Strategy

The above hypotheses are analysed by estimating models of the following form:

$$P_{st} = \alpha + \beta X_{st} + \gamma Z_{st} + s_s + \delta_t + \varepsilon_{st} \tag{2.1}$$

where P_{st} is the measure of prohibition policy, X_{st} is a vector of potential determinants of prohibition, Z_{st} is a vector of state controls, s_s and δ_t are state and year fixed effects, and ε_{st} is the error term. State fixed effects are included in the specification to control for state-specific time-invariant variables which may affect prohibition legislation such as static preferences for prohibition versus other forms of alcohol control, or a greater incidence of alcohol-related problems. Year fixed-effects control for federal-level variables varying annually which may affect prohibition policy. These include central government ideology such as the Gandhian stance on prohibition, and changes in political ideology such as a shift towards libertarian or market-based views. State-year effects were not included as this would effectively eliminate much of the variation in the data. Given this, the strategy does not control for changes within states over time which drive support for or against prohibition. As such, the main identification is from within states over time, and hence the exercise addresses the question of what determines prohibition policy within states as opposed to across states.

Equation 2.1 was estimated using generalized least squares (GLS) allowing for heteroskedasticity with each state having its own error variance. The error term, ε_{st}, was modelled as an AR(1) disturbance term with state-specific autocorrelation i.e. $\varepsilon_{st} = \rho\varepsilon_{st-1} + u_{st}$. In light of the potential simultaneity bias all right hand side variables were lagged to the previous election for political variables (such as party identity and proportion of female legislatures), and to the previous year for variables such as the crime rate and number of accidental deaths.

The analysis was repeated using the ordinary least squares (OLS) estimator with Huber-

White estimates of the standard error clustered at the state level. The GLS AR(1) estimates are efficient if the panel heteroskedastic and error correlation assumption are correct. On the other hand, OLS robust cluster estimates are always consistent though not fully efficient. The two models also have differing asymptotic properties. With GLS one estimates variance parameters for each panel (and/or covariances between panels) - the estimates therefore require many time-periods for consistency. The OLS robust clustered estimator treats each cluster as a superobservation in its contribution to the variance estimate. This requires many cluster/panels to fulfil the rank condition of the variance matrix. For the dataset used in this analysis the number of panels is relatively small (16) and time period large (44). Therefore, the GLS is assumed to be the more suitable estimator with respect to its asymptotic properties.

GLS AR(1) estimates are reported as both estimators give similar results for the majority of models estimated in this Chapter. However, in one case, the OLS robust cluster estimator gave slightly different results, indicating that the GLS AR(1) model may be misspecified with respect to its assumptions. In an attempt to resolve this discrepancy, the error assumptions in the GLS AR(1) model were re-examined to better fit the data but some differences remained. These are noted in the discussion of the results for the party variables which the OLS robust cluster model found to be jointly significant but the GLS AR(1) did not.

Table 2.2 reports summary statistics for the main variables in the analysis. The dataset is drawn from a wide variety of sources detailed in the Data Appendix. The main sample is a state-level panel dataset of the 16 major Indian states[23] over 1957-2001. The empirical strategy is to estimate Equation 2.1 using a basic set of controls and then include theorized determinants of prohibition, as captured in X_{st}, separately. The first set of determinants examined capture standard political economy variables. These include the timing of the electoral cycle, proportion of seats in the state parliament by political party grouping, political competition, and the sex and caste of legislatures. Next, the effect of the alcohol industry was analysed to assess the power of lobbying in influencing prohibition. This together with

[23]These are Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Jammu and Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, and West Bengal. Together they cover over 95% of India's population.

the analysis of state finances and the proportion of other states enacting prohibition shed light on whether states use prohibition to compete with each other for central resources. The last set of variables examine the association between the negative private and social effects of alcohol consumption and prohibition policy to infer whether there is any basis for the helping hand view of government regulation. The basic results from this exercise were then extended to examine the relationship between the major determinants of prohibition, understand the impetus behind prohibition policies, and assess the evidence for the two main theories of regulation.

2.4 Results

Table 2.3 shows estimates of Equation 2.1 including state controls only. The results show that richer states are less likely to pass complete prohibition legislation and more likely to pass partial prohibition. However, state income per capita is not significant in determining alcohol prohibition in any specification. On the other hand, urbanization is significantly and negatively associated with prohibition – i.e. more urban states are less likely to enact prohibition[24]. This suggests that urbanization, which ranges from 33% in Tamil Nadu to 10% in Assam, may be related to factors negatively associated with prohibition. Chapter 3 will show that urban households have lower participate in, and consume less, alcohol than rural households. In addition, prohibition affects urban consumption significantly more relative to rural households. Urbanization may therefore be correlated with lower alcohol-related negative effects as well as higher preferences for libertarian policies. Urbanization may also indicate a more developed or efficient tax administration system such that regulation of alcohol consumption occurs via taxation as opposed to prohibition. It is interesting to note that alcohol factories tend to be located near urban centres which suggests that urban constituencies' preferences may be shaped by economic dependence on the alcohol industry or targeted campaigning by alcohol factories. Urbanization is not significant for proportion of population under arrack prohibition or partial prohibition which is expected given that

[24]State income per capita was excluded from the analysis which follows as the F-test for per capita state income and urbanization is significant only at the 10% and the inclusion of per capita state income would reduce the sample by 55 observations. As a robustness check, all estimates reported were replicated including per capita state income as a control - the results reported were found to hold.

preferences for arrack are lower in urban households (see Chapter 3). This suggests that factors such as tastes may be important in driving the type of prohibition enacted[25].

2.4.1 The Electoral Cycle

If prohibition is due to politicians seeking to win political favour, one would expect enactment to be related to the electoral cycle. In particular, we would expect a policy like prohibition, which significantly changes production patterns in the economy and receives considerable media attention, to occur in the post-election phase when the winning party has relatively strong support and is introducing reforms in other spheres. This would also be the natural timing of policy if parties stood, and won, on prohibition platforms. Anecdotal evidence suggests this may be the case, for example in Andhra Pradesh in the mid 1990s. The Telegu Desam Party (TDP), the opposition party, worked with a large grass-roots movement for complete prohibition. When the TDP won the state elections with a significant majority overthrowing Congress, within one month of elections it enacted complete prohibition across the state.

Table 2.4 corroborates this hypothesis - the year of election is found to be a positive and significant determinant of complete prohibition legislation. This result holds once the endogeneity of election year is instrumented using a variable based on election cycle rules[26] (Columns 3 and 4). The analysis was repeated for pre-election years of 1-5 periods, and the immediate post election year but none of the coefficients were found to be significant. These results for complete prohibition also hold for arrack and partial prohibition.

[25] In addition to state controls, the effects of potential shocks to food production on prohibition were examined. Measures include dummy variables for droughts and floods, food grain production per capita, and measures of flood damage (real value of crops affected per capita, real total value of damage per capita, and real total value household goods affected per capita). None of these variables were found to be significant in determining prohibition. Measures of poverty (headcount ratio) and income inequality (income gini coefficient) were also analysed and were found to be insignificant.

[26] Election year in this specification is endogenous as elections can be called by the state government in any year within five years of the last election. Consequently it could be argued that elections are held when incumbent popularity is high enabling policies like prohibition to be passed. Alternately, if voters want prohibition, incumbents may pass prohibition legislation and then call elections. I instrument for the year of election following Khemani (2004) and define the fifth year after every election, starting from the first year when state elections were held, as an election year regardless of whether an election occurred or not. This has the advantage that it is more likely to be exogenous to state-level policies and gives greater weight to events that occurred earlier in time. The instrument is fairly correlated with the actual election variable with a correlation coefficient of 0.35.

2.4.2 Political Parties

Party identity may be an important determinant of prohibition due to ideology or historical association with voters along sex, religious or class lines. During much of the period of study, Congress was the main political force in power - both in federal and state governments. However, the political scene has fragmented in recent decades with the emergence of important left, Hindu nationalist, and regional parties. Prohibition does not appear to be closely associated with a specific party or part of the political spectrum. It is also difficult to identify libertarian parties, who would be relatively opposed to paternalism, from the available party manifestos and qualitative literature. Furthermore, rural constituencies, which the previous results suggest are correlated with prohibition, are not clearly segmented along party lines. What can be inferred is that while Congress has broad support amongst the rural poor across India, the left and Janata parties also have strong support in selected states. In addition, Hindu nationalist parties have popular support amongst scheduled castes. Urban constituencies are similarly difficult to categorize along party lines. Although, Congress has strong support among the urban working class who form the urban voting majority, the preferences of urban constituencies are often influenced by the urban middle-class whose party delineation is unclear. These observations regarding the non-specificity of prohibition with respect to parties is confirmed by a cursory glance at the data. They show that over the sample period, prohibition has been implemented by a wide variety of political groups and have often being reversed by the same parties at a later date[27].

The issue of party identity was analysed by including the lagged share of seats of different groups in the state legislature in Equation 2.1[28]. The results show no significant difference in enacting complete prohibition legislation between national parties, who compete federally across multiple states, and regional parties, who compete in specific states or

[27] Naidu and Banu (1992).

[28] An alternative approach to party identity is to aggregate parties by ideology irrespective of whether they are national or state parties. So, for example, all Congress parties were amalgamated such that Indian National Congress (INC) and the Kerala Congress (KEC) were treated as one. This approach controls for party-level decision-making regarding ideology irrespective of the political goals of the party segments. It also accounts for the possibility that splinter-groups and closely associated parties may choose to undertake the policies of the "mother" party. The latter may be particular important in states with a history of coalition governments. Aggregating parties via ideological lines corroborates the insignificant association of party identity with prohibition.

regions (Column 1, Table 2.5). National parties were then disaggregated into the following five categories[29]: (i) Congress Party (Indian National Congress + Indian Congress Socialist + Indian National Congress URS + Indian National Congress Organization), (ii) Janata Party (Janata Party + Janata Dal + Lok Dal Party), (iii) Hard Left parties (Communist Party of India + Communist Party of India Marxist), (iv) Soft Left parties (Socialist Party + Praja Socialist Party), and (v) Hindu parties (Bhartiya Janata Party + Bhartiya Jana Sangh). The results show no statistical difference between the party groups with respect to their disposition towards prohibition legislation (Column 2). Party identity was also found to be insignificant for arrack and partial prohibition.

In so far as party ideology is concerned, alcohol control policies such as prohibition may be more prevalent in parties formed along religious lines. In particular, given that Islam prohibits alcohol consumption for its followers, "Muslim" parties may be more inclined to have prohibition relative to others. To this end I separate out the parties with "Islamic" names from both the national and state groups as they were the most explicit religious group (aside from the Hindu parties) which could be distinguished from the party name[30]. Party formation along religious lines does not appear to positively determine prohibition (Column 4, Table 2.5). In fact, the share of Muslim party seats is negative and significantly different to all parties (including independent) in driving prohibition, implying Muslim parties have lower preferences for prohibition. The negative result is likely to be due to spurious correlation in that Muslim parties are represented in states which have had limited prohibition periods for other factors e.g. Jammu and Kashmir. This is not to say that religion itself does not affect prohibition either in the form of party policies or political pressure, but that given the disaggregation of party ideology available and the small sample of religion-based parties, it is not possible to detect the causal impact of religion. In fact, anecdotal evidence suggests that religious groups often compete politically simply to stand on the prohibition platform. This is the case of the coalition of "Sadhus, Maulanas, and

[29] Note that state parties are not further disaggregated as common groupings amongst them are rare. When state parties are disaggregated into main state parties and other registered state parties there is no significant difference between them in enacting prohibition.

[30] Although subjective, this was the simplest way of identifying Muslim parties as there are hundreds of parties in the other registered and non-registered grouping, not all of which have manifestos easily available. The approach taken therefore identifies a subset of Muslim parties as only parties with Islam or Muslim in their name were included.

Bishops for total liquor ban" - a small group of Hindu, Muslim, and Christian clergy who campaign for total prohibition across Indian states[31].

Given the shift towards coalition governments in many states and the predominance of the Chief Minister in determining party policy, the party identity of Chief Ministers[32] was also examined (Column 5). The results show that overall party identity of the Chief Minister does not reflect significant distinctions in prohibition preferences between parties, relative to each other or to independents. The exception to this are Hard Left parties who are (weakly) less likely to be associated with prohibition relative to Congress, Janata, Hindu and Regional parties. In addition, Congress is found to be less likely to be associated with prohibition relative to the Janata Party.

In all the estimates in Table 2.5 the F-test of joint significance of party variables is insignificant implying that party identity is not an important factor in determining prohibition policy. However, OLS robust cluster estimates (Column 3) find the party variables to be jointly significant at the 1% level[33]. In spite of this result, there are no significant differences between the main party groups in determining prohibition for the OLS estimates, although most parties were found to be pro-prohibition relative to Other parties. F-tests for the joint significance of Chief Minister's party were insignificant for both GLS AR(1) and OLS robust cluster estimates. The lack of an identifiable association between party identity and prohibition policy may be due to several factors. There may be limited variation in the political groups as Congress dominated the political scene up to the late 1970s. Secondly, the rise of coalition governments during the 1990s, implies that unless prohibition was one of the main issues in the party mandate, enacting prohibition policy would be much harder if this was solely on the basis of party ideology. This, together with the rise of regional parties and personality politics, meant that the identity of the Chief Minister, rather than the party itself, was the key factor in pushing policies through. Bearing these caveats in mind the results, together with the qualitative evidence, indicate that prohibition is not part of

[31] Asian Age, 6th July 1998.

[32] In coalition governments Chief Ministers are usually appointed from the majority party or the strongest in the coalition of parties. In cases where there are two dominant parties in the coalition, the position of Chief Minister usually alternates.

[33] F-tests (and P-values) of joint significance of the party variables using the OLS robust cluster estimator for the other models in Table 2.6 are 2.82 (0.075), 5.69 (0.002), and 0.84 (0.560) for Columns 1, 4, and 5 respectively.

the core mandate of political parties in Indian state politics and point to the possibility that it is a policy enacted in response to particular circumstances. The following sections further explore what these circumstances may be by assessing the relationship between prohibition and political competition, characteristics of legislatures, and lobby group pressure.

2.4.3 Political Competition

The result on year of election indicates that prohibition is related to politicians seeking to win votes. The political economy literature notes that political competition may enhance the responsiveness of political agents to voters' preferences by making incumbents less secure. The extent of competition may therefore affect the probability of prohibition policy being enacted such that it is enacted more during periods of low political competition. For incumbents, more competition in the form of a larger consolidated opposition may make it harder to pass legislation per se, and prohibition legislation in particular, if this reflects party ideology rather than the campaign manifesto.

Following Besley and Burgess (2000) I measure political competition as the absolute difference between the number of seats held by the majority party and its main competitor[34]. The extent of political competition in the legislature does not significantly affect the passage of prohibition policy (Columns 1 and 2, Table 2.6). This further strengthens the result that prohibition is not related to party ideology but is included in the campaign manifesto as a measure to win votes. This follows as the results show that when parties win, prohibition platforms cannot be easily blocked by the opposition. Whether parties respond differently to political competition with respect to enactment of prohibition was examined by including interactions of the proportion of party seats with political competition. Overall when the power of the main opposition party is low, the higher the proportion of seats won by other parties, the more prohibition legislation is observed. In particular, the interactions show that given a specific level of competition, Hard Left parties are less likely to have prohibition relative to all parties except the Soft Left grouping. These results suggest that when the

[34]This is slightly different from the Besley and Burgess measure who take the absolute difference between the number of seats held by Congress, which was the dominant party over 1958-1992 (their period of study), and its main competitor. This approach was not used in the analysis as since 1992, there have been several states where Congress is no longer the dominant party in power. Nevertheless, the original Besley and Burgess measure was used as a robustness check to corroborate the results presented.

opposition is more fragmented it is easier for incumbents to pass prohibition legislation, perhaps due to greater ease in passing legislation in general.

If prohibition policy is factored in at the campaign stage it may be illustrative to examine electoral competition further. The analysis of political competition above can be seen as a proxy for both legislature competition (difficulty of majority party in enacting reforms) and electoral competition (the threat of the opposition when campaigning for votes). In addition, it is useful to examine the number of parties running in elections as a measure of the dispersion of political ideology. One might hypothesize that the greater the number of parties running the more likely prohibition policies are to be part of campaign manifestos as parties attempt to differentiate between each other. On the other hand, electoral competition may induce the major parties to converge to similar policies as no one wants to take a risk on a new policy (given no link between prohibition and ideology). Columns 3 and 4 of Table 2.6 show that the party choice spectrum is not significant in determining prohibition policy corroborating the earlier result on political competition. Table 2.6 also includes the number of contestants per seat as a measure of political competition. Although this measure is more diffuse compared to the previous two, it may be indicative of competition particularly from independent candidates. This may be more relevant in the first three decades since Independence when district level politics were dominant and where personality politics may have overridden the influence of state level party ideologies. The implication is that individuals could more easily adopt prohibition stances in particular locals. However, the number of contestants per seat is also found not to be significant in determining prohibition policy.

2.4.4 Legislature Identity

The characteristics of politicians, in particular gender and caste, may be an important determinant of state policy. In a standard political economy model (for example, Downs(1957)) where politicians are vote maximizers and can pre-commit, politician's policy choices should reflect the preferences of the electorate and not be related to their individual characteristics. However, research by Kalt and Zupan (1984) and Levitt (1996) shows that legislature ideology is a key determinant of policy outcomes even after controlling for the party line and

voter preferences. There is also evidence of legislature composition effects on policy choice. Pande (2003) finds that caste reservation in Indian states has in turn increased targeted transfers to scheduled castes and scheduled tribes (SC/STs). This is further corroborated by Chattopadhyay and Duflo (2001) who find that female legislatures in local governments in rural India behave differently relative to men such that their policy choices appear to better reflect female preferences. Together these findings lend support to recent political economy models such as Besley and Coate's (1997) citizen-candidate approach where legislature identity influences policy outcomes over and above voter preferences.

Sex of Politicians

The sex of elected officials may be particularly important with respect to prohibition as the qualitative evidence indicates that women on average tend to favour prohibition policy (Kumari and Salaam, (1997); Pathak (1985); Reddy and Patnaik (1993)). A key proponent of the prohibition movement since the 1980s was NGOs working with women's welfare groups who collaborated with anti-liquor movements to campaign for stricter alcohol regulation. That women may have difference policy preferences to men is not a new hypothesis and has been observed widely in previous work in the US by Shapiro and Mahajan (1986), Lott (1999), Alesina and La Ferrara (2002), and Edlund and Pande (2003). If these preferences spill over to politician's preferences, as in citizen-candidate models, then female legislatures are more likely to be associated with female-oriented platforms simply because it reflects their own ideology[35]. A similar argument emphasizes that, regardless of the legislature's preferences over prohibition, if prohibition policies were bundled with other family-oriented policies which female politicians may have a preference for, we would find a positive relationship between the proportion of female politicians in the state government and prohibition policy.

Female politicians or state legislatures with a high proportion of females may be more associated with female-centric policies for several other reasons. If there is imperfect information about voter preferences, a high proportion of females elected may signal a high

[35]Note that voter perception of politician's type simply by their sex will not in itself produce the same result as in this framework politicians cannot commit to a policy choice misaligned to their preferences.

preference for female-oriented policies by the electorate. Therefore, the legislature as a whole may pursue such policies regardless of the preferences of any individual female politician. In addition, women's welfare lobby groups may differentially target female politicians as a more legitimate vehicle to voice their concerns over family welfare and health issues. As the proportion of female legislatures increase this may have a magnifying effect as the perceived legitimacy of such concerns increases over the whole legislature.

Table 2.7 reports estimates of the effect of the proportion of state government female legislatures on complete prohibition. As female representation may be driven by party ideology - parties with a higher proportion of female candidates may also be parties with more liberal policy platforms – party controls were included in Column 2. The basic estimates indicate that the sex of the legislature has no effect on prohibition policy, although in some specifications there is a weak positive coefficient. When the share of female seats is instrumented using female literacy rates to ameliorate endogeneity concerns[36], the results show that legislatures with more female politicians significantly favour less prohibition of all types. Interactions of the share of party seats with those of female legislatures show that women in the Congress party are less likely to enact prohibition relative to women in Hard Left parties.

There are several possible reasons for this observed negative effect. If one believes that female politicians reflect female preferences then their correlation with less prohibition would imply that the female electorate has a lower preference for paternalism relative to men. However, the proportion of voter turnout that is female is not significantly associated with prohibition which is hard to reconcile with the qualitative evidence on the role of women in advocating prohibition in India and in the US in the 1920s[37]. Furthermore, interactions of the sex of the turnout with legislature characteristics are not significant in determining prohibition.

[36] Female politicians may be endogenous as prohibition platforms or past prohibition may have increased the chance of females being elected. The identifying restriction is that female literacy is highly correlated with female politicians in the state legislature but orthogonal to prohibition policy. While overidentification tests are not possible, reduced form estimates of female literacy on prohibition find insignificant results. This indicates that the channel through which female literacy works is via female legislatures which is consistent with an empowerment story.

[37] The proportion of the female electorate which voted was also found to be insignificantly related to prohibition.

An alternative explanation is that female representation is proxying for higher state-level female empowerment. Given the literature on the political gender gap (Edlund and Pande (2003), Alesina and La Ferrara (2002)[38], one would expect periods of greater empowerment to be correlated with less government as women no longer require the state to intervene in the case of missing markets. Within such a framework, women would no longer patronize prohibition as they would not require such paternalistic policies to gain greater control of household resources or improve their individual welfare.

The observed negative result may arise as female legislatures may be less inclined to promote radical policies like prohibition. Female politicians may be less secure in their constituencies due to shorter tenure and/or more political competition and may be disproportionately elected in legislatures with less effective power (the so-called desirability hypothesis)[39]. We would therefore expect to observe the negative relationship between female politicians and prohibition policy if this effect is not controlled for. The effect of the desirability hypothesis was explored by including the population per constituency seat[40]as a measure of the effective power of the state legislature. While the quality of seat is negatively related to the proportion of female politicians it is insignificant in affecting prohibition, hence the negative effect on female politicians on prohibition remains.

Caste of Politicians

Another identifiable characteristic of legislatures is whether they belong to the scheduled caste or scheduled tribe group. Given Pande's (2003) result and that Chapter 3 finds alcohol consumption to be significantly higher for SC/STs, we may expect preferences for prohibition to differ along caste and tribe lines. Table 2.8 shows that scheduled legislatures

[38] Alesina and La Ferrara (2002) find that women in general have a higher preference for redistributive policies, a proxy for larger government and general government intervention in markets. This differential may be due to lower income, greater risk adversity or a lower equality of opportunity. Edlund and Pande (2003) find that female preferences for the Democratic party, and hence liberal redistributive policies, is higher when there is greater prevalence of divorce which is posited to be correlated with falls in women's income.

[39] The desirability hypothesis states that female politicians are overrepresented in legislatures of poorer quality or with less effective power either due to lack of male competition or due to electorate bias in voting women disproportionately into positions of less importance (MacManus and Bullock (1995)).

[40] There is substantial variation in this variable - from 49 to 385 adults per seat. Population controls were included in the models using this variable.

have a preference for prohibition policies, and that this effect is driven by SC politicians[41]. This effect does not vary by sex of scheduled caste politicians. The differential effect by SC and ST legislatures is interesting - drinking is significantly higher for both groups, so one would expect the associated preferences for prohibition to be similar. One reason for the divergence may be that alcohol consumption comprises an integral part of the social custom and norm of many scheduled tribes[42] which is not the case for SCs in general. This cultural aspect of alcohol consumption may temper prohibition preferences amongst STs.

The finding that female and SC legislatures are associated with prohibition policies despite no significant preferences for prohibition amongst voters[43] or party groups suggests that prohibition is not enacted to reflect the preferences of the average electorate. It may therefore arise due to politicians reflecting the views of preferred constituencies, individual preferences, or those of lobby parties such as alcohol factories or anti-liquor groups.

2.4.5 Alcohol Lobby Power

Under the *grabbing hand* view of government regulation, the role of the alcohol lobby in the policy process is an important determinant of prohibition policy. The literature on pressure group politics purports that lobbying affects policy choices in three main ways. In the menu-auction approach (Grossman and Helpman (1996a)), lobby groups compete to influence policy decisions by offering policy-makers policy conditional favours e.g. transfers or patronage. Alternately, lobbies can affect the possible policy spectrum by contributing to election campaigns and hence influencing the probability of election for the candidate or party. Lobbies can also align themselves with particular parties or form parties based on their group ideology. Within this framework, campaign contributions buy the votes of impressionable voters or act as a signal of candidates' positions on particular policy issues (Austen-Smith (1986), Baron (1994), Grossman and Helpman (1996a)). Finally lobbying activity can be interpreted to provide information to policy-makers regarding voter prefer-

[41] The proportion of scheduled tribe seats is weakly significant in Column 2 but loses significance once population controls for total SC/ST population are included. These are not included in every specification as data re available only up to 1991.

[42] For example, toddy is served at all important events such as marriage, birth, and divorce and an important part of the rituals connected with death (Saldanha (1995)).

[43] Caste of voters was not available.

ence intensity (Lohmann (1994)).

Pressure groups in India are inextricably linked to the political decision-making process by way of party finance or party ideology despite legislation banning direct political donations[44]. Amongst them, business interest groups, such as the Federation of Indian Chambers of Commerce and Industry (FICCI), are widely regarded as being the most influential[45], playing an active part in India's Constitutional Reforms, Five Year Plans, and numerous government Advisory Boards and Parliamentary Committees[46]. In the context of alcohol policy, business groups such as the All India Distillers Association and All India Breweries Association play an important role in lobbying state governments and promoting the objectives of the alcohol business community. In addition, in most states, "liquor lobbies", comprising of the main regional alcohol companies, are heavily involved in party campaign finance and policy influence. For example, in June 2003 the Samata Party president declared that much of Karnataka politics was driven by the policy preferences of liquor lobbies and urged party leaders to avoid their influence[47]; in Kerala the United Democratic Front's (UDF) election manifesto declared it would scrap the incumbent Left Democratic Front's (LDF) strict liquor policy if it came into power due to its alleged connection with the alcohol industry[48]; while in Madhya Pradesh Chief Minister Digvijay Singh and the Excise Minister allegedly received kickbacks of Rs10 crores and Rs2 crores respectively from the owners of Som Distilleries[49].

The main attempts of the Indian alcohol industry at policy influence focus on creating artificial barriers to entry, indiscriminate issue of licenses and permits, lower state excise

[44]The Companies Act of 1913 and 1956 did not initially allow for political donations in cash. However, in 1960 a new section (Section 293A) was added which permitted a company to contribute to political parties (or political purposes) Rs25000 or 5% of its net profit in the last three financial years, whichever was higher. This was as long as the details of such donations were shown in the companies' profit and loss accounts. In 1969 there was total ban on political donations initiated by the lack of implementation of the previous act. Companies by-passed this ban by contributing heavily for high-rate advertising space in party newspapers and periodicals, or purchasing party souvenirs. This resulted in significant contributions for example, in 1977, 882 companies contributed approximately Rs8 crores to political parties.

[45]For example, the FICCI saw that the provision in the Representation of People Bill (No.2, 1950) which disqualified a trader or businessman from being elected as a Member of Parliament or State Legislature was deleted. This later became an Act.

[46]These include Advisory Committees on Capital Issues, Board of Trade, Export Promotion, and Customs and Central Excise amongst others.

[47]Times of India, 8th June 2003.

[48]The Hindu, 29th April, 2001.

[49]"Mr Clean fights back", The Week, 16th September 2001.

rates, and biased alcohol regulation. Anecdotal evidence suggests that the alcohol industry frequently lobbies for the prohibition of home and locally brewed alcohol, such as toddy, to increase market shares of factory-produced alcohol such as arrack and IMFL[50]. We should therefore expect states and/or periods with powerful alcohol lobbies to be associated with lower periods of complete prohibition and potentially lower partial prohibition insofar as this is prohibition of alcohol produced in large distilleries. I estimate the effect of the alcohol industry on prohibition using the number of state alcohol factories which includes all registered distilleries, beer and wine manufacturing plants. The mean for this variable is 10 factories across the sample but varies widely across states from an average of 18 in the 6 alcohol producing states to 5 in the remaining. As such, the number of alcohol factories is a proxy for the power of the liquor lobby as no data on the extent of lobbying activity, and hence influence, is available. However, it is likely to be correlated with the overall size of the alcohol industry (as measured by production or profits) and thereby alcohol lobbying activity.

The estimates in Table 2.9 show that alcohol factories are weakly and negatively related to the proportion of population under complete prohibition policy[51]. However, the model in Column 1 suffers from endogeneity bias as past prohibition may influence the size of the alcohol industry. To correct for this, the alcohol industry variable was instrumented with a measure of labour regulation which identifies pro-worker, neutral, and pro-employer labour regulations from State Amendments to the Industrial Disputes Act and accumulated over time (Column 4) [52]. The estimates show that the size of the alcohol industry is not significantly related to the proportion of the population under complete prohibition (Column 2) but is significantly associated with periods of complete prohibition across the whole state (Column 5). This result also holds for arrack and partial prohibition. The alcohol industry therefore lobbies more strongly against prohibition enacted across the whole state rather

[50] "Coconut Punch", The Week, 28th October 2001.

[51] Whether certain parties are more receptive to lobby group power was also investigated. I find that the alcohol lobby is party neutral in influencing the state legislature. This may be because lobbying is carried out across all party lines irrespective of identity, as one would expect if the lobby wanted to maximize the chances pro-alcohol legislation.

[52] This measure was derived by Besley and Burgess (2004). Given that accumulated legislation may indicate a more active state, and hence one more prone to enact legislation, the analysis was repeated using non-cumulated measure of labor regulation. All results were found to hold.

than in selected regions. This follows given the effect state-wide prohibition has on the market for alcohol.

The effect of manufacturing on prohibition was examined as a robustness check to ascertain that it is the alcohol industry specifically which is driving the negative result and not industrial development as a whole (Columns 3 and 6). The insignificant result provides strong evidence that the negative result on alcohol prohibition is being driven by alcohol producers. As an additional robustness check all the independent variables were lagged one election period to control further for the effects of past prohibition on alcohol industry size. All the above results were found to hold under this specification.

The result that prohibition policies are enacted in states where there is a smaller alcohol industry confirms Munger and Schaller's (1997) finding for the US National Prohibition that prohibition was, in part, due to alcohol producers' interests failing to mobilize effectively in 1919. By 1933, the alcohol lobby, despite suffering significant economic losses, managed to organise into an effective, and powerful, lobby to precipitate the repeal of the Eighteenth Amendment which enacted prohibition. This result, together with the finding that prohibition occurs in election years, indicate strong support for the grabbing hand view of government. Given that alcohol production is not significantly related to consumption, it cannot be argued that this negative effect is due to higher alcohol consumption and hence higher negative effects of alcohol. Under one interpretation of the grabbing hand view of government, regulation is pursued by political actors to extract rents from lobby groups in the form of campaign contributions or bribes. While the analysis could not measure this directly, the finding that alcohol policy is weaker in alcohol producing states suggests that alcohol industry lobbying is a crucial factor in ensuring that prohibition legislation does not occur.

2.4.6 The Role of State Finances

State Tax Systems

The helping hand view of government regulation implies, amongst other things, that in the presence of market failures prohibition may be efficiency improving if taxation systems are weak and unable to affect alcohol demand functions. We should therefore expect to

observe prohibition during periods of weak tax administration or in states where the tax base is small. A simple indicator of the development of the tax system is the ratio of tax revenue to gross domestic product (GDP). This is found to be insignificant in determining prohibition of any kind (Column 1, Table 2.10). Alternate indicators for the development of the taxation system are the proportion of non-tax revenues in state finances[53] and the proportion of sales taxes in total tax revenue. Higher non-tax revenues indicate inability to raise funds via taxation and reduce the financial constraint on governments who wish to enact prohibition and therefore should be correlated positively with it. Higher shares of sales taxes indicate an underdeveloped tax system, due to lack of infrastructure or compliance, such that indirect taxes are easier to collect. The econometric analysis finds that these measures are also insignificant in driving prohibition legislation.

The results therefore indicate that prohibition is not enacted due to underdeveloped tax systems where tax policy is ineffective, from an institutional perspective, in curtailing alcohol demand. However, a key factor in the policy choice between prohibition and taxation in reducing alcohol consumption is the elasticity of alcohol demand. The exiting research for India is mixed with some studies finding evidence of price inelasticity (Reddy and Patnaik (1993); NCAER (2001)) and others finding that demand is elastic for specific segments of the function for particular demographic groups (Mahal (2000)). While cultural preferences, amongst other factors, may give rise to varying elasticities, the literature in developed countries have found strong evidence that alcohol is price elastic and affected by taxation over large parts of the demand curve[54]. Taken together, the results suggest that the impetus for prohibition versus taxation is not driven solely on the basis of which is the most efficient tool for reducing alcohol consumption and may be driven by other factors.

State Excise

The composition of state finances, in particular the reliance of public finances on state-raised receipts, is likely to be an important determinant of prohibition policy as it may

[53] Non-tax revenues are, on average, 37% of states revenues and range from 25% in West Bengal and Tamil Nadu to over 70% in Jammu and Kashmir. The major components of non-tax revenues are central grants and state non-tax receipts which include: interest receipts, dividends and profits, royalty receipts and fees due from government provided services.

[54] See Cook and Moore (1999) for a review of the existing research.

affect the financial capacity of the state government. The key component of state finances affected by prohibition is state excise which is raised mainly from taxes on the production and manufacture of potable alcohol[55]. State excise revenue can be a significant proportion of state finance, ranging up to 23% of total revenues in some cases. The relationship between state excise and prohibition is also important from the perspective of policy levers as governments may choose to influence demand via taxation rather than prohibition, given alcohol price elasticity[56]. We should therefore expect to see a negative relationship between the two variables as per the results in Table 2.10 which show that states with a higher proportion of revenues from state excise enact less prohibition[57]. This effect holds when state excise is lagged to the previous election. The result is as expected firstly, because higher alcohol taxation may in itself be an alternative to prohibition in curtailing alcohol demand; and secondly because higher state excise may indicate a larger alcohol industry and hence a larger, more powerful, liquor lobby[58]. The analysis focuses on state excise collected rather than the actual state excise rate, which is more precise in examining the policy choice between prohibition and tax rates, as data on the latter is limited and subject to comparability problems both within states and across time[59]. For the question under study, actual revenue shares have the advantage that they represent the burden of prohibition for the state budget more accurately as higher excise rates are not necessarily indicative of higher state excise revenues.

[55] State excise is also levied on opium, Indian hemp, and other narcotics but this forms a relatively small proportion of receipts.

[56] Abraham (1995); Mahal (2000).

[57] The interaction of the party variables with the share of state excise in total revenue shows no party effect on prohibition given the level of state excise.

[58] The latter applies only when comparing state excise rates to prohibition periods where the effective excise rate is 100%. Once we exclude prohibition years, it could also be argued that high state excise revenues are indicative of weaker alcohol lobbies as they may reflect high excise tax rates. It should also be noted that state excise and prohibition need not be two ends of the policy spectrum and could be positively correlated with high state excise rates being a precursor to stricter regulation of alcohol via prohibition.

[59] State excise rates can be levied by alcohol type, volume (cases, bottles or liters), or concentration and can be lump-sum, percentages or a mixture of both making calculation of an average state excise rate prone to large margins of error.

Central Excise

Another important element of state finance is transfers from the central government. Central revenues may be important in determining prohibition as ex ante, prohibition may be used by states to extract rents from the centre if state raised revenues are low and likely to be unaffected by prohibition, that is state excise and sales tax revenues from alcohol are small. Ex post, states may lobby for increased resource transfers during prohibition periods due to the fall in state excise. This has been documented for several states who have run into financial problems during prohibition periods[60].

Central transfers are of two main types - grants and revenue transfers and shares of central union excise[61]. Grants and share of central receipts are on average 18% of state revenues and comprise of statutory transfers to state budgets and plan transfers to support state development plans. The level and distribution across states of both are determined by distinct central commissions and are theoretically based on complex rules and conditionalities[62]. While transfers in the form of grants are made to assist state governments to overcome exogenous shocks such as earthquakes or floods, they are not fungible across budget items and generally not given to offset the decrease in excise revenues from prohibition enactment[63]. Central union excise is revenue from indirect taxes levied on the production and inter-state sale of all commodities manufactured in India[64]. It is on average 6% but ranges up to 20% for some states. Union excise share are determined by the Finance Commission and is distributed across states based on general economic indicators, population,

[60] For example, Chief Minister Rao of Andhra Pradesh lobbied the centre to compensate the state for the revenue loss during the 1995-97 prohibition of alcohol (Vyasulu (1998)). Naidu and Banu (1992) also recount how the government of Tamil Nadu lobbied the centre for grants during the 1970s to offset its decline in revenue from prohibition.

[61] A third category comprises of grants for central schemes, the use of which is tightly controlled by central ministries through detailed rules and regulations.

[62] Statutory budget transfers are determined by the Finance Commission, an independent entity with constitutional authority. Its members consist of technical experts appointed by legal decree. Plan transfers are determined by a national council headed by the national political executive with representatives of state political leaders. As such, allocation of the former tends to be more rules-based than the latter which allows some discretion in allocation (Khemani (2003a; 2003b)).

[63] For example, the state of Andhra Pradesh did not receive any grant transfers in lieu of its prohibition policy in the 1990s and is still experiencing the problems of high state debt which arose partially from it.

[64] It excludes: (a) alcoholic liquors for human consumption and (b) opium, Indian hemp, and other narcotic drugs, but includes medicinal and toilet preparations containing alcohol or any substance included in sub-paragraph (b). For more information see the Seventh Schedule of the Constitution.

per capital state domestic product, indicators of backwardness, and tax collection and tax effort[65].

The proportion of grants from the centre is not significantly related with prohibition policy[66] (Column 5, Table 2.10). On the other hand, the distribution of the share of central excise across states is strongly associated with prohibition - states with a higher share of central union excise are also those who enact prohibition. This lends credence to the hypothesis that centre-state relations are important to ease any financial constraint arising from prohibition policies and hence may lead states to enact prohibition in order to extract central rents.

The result on central excise shares corroborates findings from the literature on intergovernmental transfers (Chhibber (1995); Khemani (2003a, 2003b, 2004); Rao (2001)). These papers find that for India, the inter-state allocation of central grants and state deficits (through central financing) are subject to political economy considerations, particularly partisan politics. Khemani's (2003a) differential result, that this holds for the planned grants component of central transfers but not the statutory grants component, was not found with respect to prohibition policy. However, this is not surprising because allocation of both are not based on any criteria related to the state's own tax revenue while that of central excise share explicitly is. Consequently it is more likely that states can argued for increased transfers from union excise when prohibition affects state excise relative to transfers via central grants. In fact, some state governments, such as the Government of Tamil Nadu, have contested inter-state allocation of union excise on the grounds that the allocation mechanism incorporates an inherent moral hazard. This arises as it rewards states with lower own-tax revenues due to inefficient tax systems or "foolhardy" policies like prohibition (Naidu and Banu (1992)). Given the importance of partisan politics, the political alignment of the state and central governments with respect to prohibition enactment was also examined. However, no significant effects were found.

[65] Rao (2001).

[66] A positive relationship would result if the underlying factors determining central grants, excluded from the analysis, were also related to prohibition policy such as state income per capita, population, or poverty rates (all of which are significant determinants of central grants). As these controls were not significant in determining prohibition, this result confirms the previous analysis that income per capita is not related to prohibition policy.

2.4.7 Mimicry

The above result on centre-state transfers suggests that prohibition in other states may influence policy makers to enact prohibition. This may occur through three main channels. Firstly, state governments may "mimic" other states which enact prohibition. If prohibition is seen to work well elsewhere such developments may influence citizens' preferences over alcohol policy choices such that politicians are lobbied or voted in to change state policy. Secondly, prohibition policy in neighbouring states may make it harder logistically to sustain already enacted prohibition. For example, if neighbouring states lift prohibition, the increased difficulty of patrolling state borders and the ensuing rise in illicit liquor into prohibited states, may encourage the lifting of prohibition. Thirdly, as more states enact prohibition, the relative gains from prohibition, both from an economic and political economy perspective, may change.

Table 2.11 shows that as more states enact prohibition policy, states without prohibition enact less prohibition in the following year. The negative result may arise from two separate factors. A selection effect—as more states enact prohibition, the states which do not are disproportionately those who may be strongly opposed to prohibition policy. Secondly, as more states enact prohibition the marginal benefit of prohibition, with respect to eliciting transfers from the centre, decreases thereby inducing non-prohibition. This may be offset by states using prohibition to maintain existing central excise shares. The negative effect may also result as the proportion of states with prohibition increases the potential gains from alcohol production for non-prohibition states also increases. Prohibition in other states may result in alcohol factories moving to other states producing much stronger liquor lobbies and lower incentives for politicians to enact prohibition. Even in the absence of this effect, state governments may strategically avoid prohibition to enable local factories to ripe the benefits of smuggling and greater demand for alcohol from state border areas.

To examine these hypotheses further, the state-wide concentration of alcohol factories was included in the estimation in Table 2.11 (Column 3). This variable measures the relative size of the alcohol industry across Indian states[67]. The negative effect on the proportion

[67] See Column 7 of Table 2.10 which shows the proportion of alcohol factories in a state negatively determines prohibition even after instrumentation using the labor regulations variable.

of states enacting prohibition remains. However, its interaction with the share of alcohol factories is significant and positive – i.e. given the relative size of the alcohol industry, the greater the proportion of other states enacting prohibition the more prohibition is observed in a given state. This result means that after controlling for selection and the alcohol industry the effect of other states' prohibition policy on own-state prohibition is positive. The finding is consistent with both a mimicking effect due to preferences changes and due to inter-state competition to maintain existing central-excise shares.

2.4.8 Negative effects of alcohol

The negative effects of alcohol consumption may be important determinants of prohibition policy. While the negative effects of alcohol may be a function of alcohol consumption, they also depend on varies other factors such as the culture of drinking and type of alcohol consumed[68]. Under the helping hand view of government regulation, higher negative effects of alcohol would induce governments to increase regulation to correct for externalities or errors in private decision-making which lead to overconsumption. In practise, governments may be more responsive to certain types of negative effects like externalities which may be of greater concern than private effects of detrimental consumption.

Prohibition during periods when alcohol-related problems are high is also consistent with the grabbing hand view of regulation if this influences electorate preferences and hence the probability of politicians being re-elected. The literature on women's movements against alcohol cite the large private and social costs associated with alcohol consumption as the key reasons for enacting prohibition (Kumari and Salaam (1997); Pathak (1985); Reddy and Patnaik (1993)). It is therefore likely that such lobbying informs politicians about electorate concerns and preferences over policy choices.

Alcohol related deaths and diseases

A primary negative effect of alcoholism is the private effect on health resulting in alcohol-related diseases such as liver cirrhosis or deaths. These can occur due to prolonged and

[68] A good example is France which has higher per capital alcohol consumption than the UK but has lower records of drink-related problems.

excessive alcohol consumption or due to consumption of spurious liquor. Health statistics in India on alcohol-related deaths and diseases are fairly precise with respect to coverage of illnesses and cause of death but subject to frequent changes in definitions over the sample period. The analysis therefore is based on the most accurate and consistent data series available. Table 2.2 shows that liver-related illnesses or deaths are not associated with prohibition policy. Given the long-term nature of these diseases, the right-hand side variables were lagged by 4 and 8 years as a robustness check - but the insignificant effect remained. This result could be due to the small magnitude and variation in the rate of these diseases such that empirically an association with prohibition cannot be detected. Alternately they might be too small relative to the burden of death and disease from other causes to warrant significant policy shifts as per prohibition. They may also not receive the media coverage required to precipitate policy. However, deaths due to spurious liquor and accidental poisoning, which tend to be widely covered in the media, was also found to be insignificant in relation to prohibition. Overall, bearing the caveats regarding the data, the results indicate that prohibition policy is not necessarily enacted as a response to the negative private effects of alcohol consumption.

Externalities

There is extensive literature on the negative externalities of alcohol which show the link between alcohol consumption and crime, domestic violence, and road traffic accidents[69]. It is therefore plausible to assume that as these increase, governments may wish to curtail alcohol consumption. I examine the effect of indicators of differentiated crime and road accident deaths on prohibition in Table 2.13. The results indicate no effect of crime, including rape, murder, thefts, burglary and robbery, on all types of prohibition policy. In addition, road traffic deaths are not significant in determining prohibition. It will be shown in Chapter 4 that these results on alcohol related deaths, crime, and road accidents are not entirely due

[69]The Bureau of Justice Statistics (1988) reports that in the United States approximately 60% of all persons convicted of assault had been drinking just prior to the crime. See Markowitz and Grossman (1998; 1999) and Markowitz (1999; 2000a; 2000b) for an extensive survey on the relationship between alcohol, crime and domestic violence. Levitt and Porter (2001) find that in the US drunk drivers are involved in 30% of all fatal accidents on the road. This proportion increases to 60% in periods when alcohol consumption is greatest.

to lack of variation in the data as prohibition does have an effect of some of these variables. Furthermore, while the sample size of the latter are relatively small the data on crime is of a long time span and of relatively good quality.

The results from this levels analysis strongly imply that efficiency considerations arising from greater negative (both private and social) effects of alcohol consumption are not the primary focus of alcohol prohibition. Yet this is not sufficient to negate the helping hand view of government. This is because the view is also consistent with prohibition not being associated with the negative effects of alcohol consumption if alternate methods are used to curtail demand, such as taxation. While this cannot be explicitly tested due to the lack of comparable data on alcohol taxes, the results on state excise suggest that this may be plausible.

This view of government also purports that prohibition would result if taxation systems were under-developed. However, the results in Table 2.10 show that the efficiency of the tax system does not determine alcohol prohibition. Nevertheless, to investigate the effect of tax systems, interactions were included into the analysis in Table 2.12 and 2.13 of the private and social effects of alcohol with the proportion of tax revenue to state income. The insignificant result of these variables with respect to prohibition policy remains. The insignificant effect is consistent with the helping hand view if alcohol demand was inelastic and therefore unaffected by taxation. However, as earlier noted, alcohol demand is price elastic and hence open to influence by the tax rate. Therefore, prohibition cannot be easily defended on the basis of poor tax systems and/or inelastic alcohol demand functions. Taken together, the results strongly suggest that prohibition policy is not necessarily enacted improve the efficiency of the market.

2.4.9 Extensions

The analysis above identifies several factors driving prohibition policy. Prohibition is found to be enacted during election years in states with high rural populations and a small alcohol industry. It is also associated with states with have relatively low state excise and relatively high central excise shares. Prohibition tends to occur in states when the proportion of other Indian states implementing prohibition is relatively small. While party identity, political

competition, and sex of the electorate are not significant determinants of prohibition, legislatures with higher proportion of scheduled castes and lower proportion of female politicians tend to enact prohibition legislation.

The results provide strong evidence that prohibition is related to political economy considerations. In particular, the finding that non-alcohol producing states and states with a higher share of central union excise have more prohibition suggests that prohibition is enacted to enable non-alcohol producing states to extract higher central transfers. This is assuming that there are no underlying factors which simultaneously determine non-production and higher central excise shares[70]. Table 2.14 shows that given the relative concentration of the alcohol industry, lower state excise shares and higher central excise shares illicit more prohibition. Therefore, over and above any effect the alcohol lobby may have on policy, the composition of state finances plays an important role in determining prohibition. In particular, given the size of the alcohol industry, the higher the central excise share the higher the preference for prohibition.

The hypothesis is strengthened by the finding that the relative incidence of prohibition decreases as more states enact the policy as the ability to extract additional transfers decreases at the margin. Examining the interaction between the proportion of states with prohibition and central excise share we find that given the proportion of states with prohibition policies, the higher the central excise share, the more likely the state is to enact prohibition. This indicates that states which are relatively stronger in eliciting central transfers are also those most likely to have prohibition. Alternately the result can be interpreted as given the central excise share, as more states enact prohibition, the more likely prohibition legislation within a particular state is. This may be due to inter-state competition in attaining or maintaining central transfers - a strategy akin to competitive devaluations, price under-cutting, and off-setting advertising. This corroborates the finding in Table 2.11 that given the concentration of alcohol factories, the greater the proportion of states with prohibition the more own-state prohibition is enacted. Within this framework, prohibition

[70] While central excise shares are based on indicators of economic backwardness and tax effort, state income per capita and the development of the tax system were both found to be insignificantly related to prohibition. There is also limited association with alcohol production i.e. alcohol producing states are not necessarily the richest or more developed. Furthermore, it has been shown that alcohol consumption is not driving the result behind alcohol production and prohibition.

can be also used as an effective mechanism by non-producing states to cut off finance for producing states. This follows as state excise is levied on production, and hence collected by alcohol producing states, and passed through to the consumer via higher prices, paid disproportionately more by non-producing, consuming states. The state of Karnataka is a case in point where in the 1990s it toyed with the idea of prohibition of consumption but not on the manufacture of alcohol to address precisely this issue.

Given that prohibition tends not to occur where the alcohol industry is powerful, the relationship between it and the other determinants was examined. Controlling for the alcohol industry, prohibition still occurs during the election year (Table 2.15). The interaction of alcohol industry with political parties and political competition remained insignificant. This is as expected given that prohibition was found not to be associated with political ideology. Given the size of the alcohol lobby, a higher proportion of female and scheduled caste legislatures implies more prohibition. The result on the sex of politicians suggests that women tend to get voted in more urban, alcohol-producing states which are associated with lower prohibition. Once these are controlled for, the causal effect of women politicians is to increase prohibition legislation. This is consistent with prohibition being associated with women's anti-liquor grass-roots movements. The effect of the alcohol industry and the negative indicators of alcohol consumption, such as liver disease and crime, were also investigated. As per the levels analysis, no significant results with respect to prohibition were found.

2.5 Analysis

The above econometric results offer little support for the helping hand view of government regulation in relation to alcohol prohibition in India. Prohibition is not associated with private or social negative effects of alcohol consumption such as incidence of liver disease, deaths from alcohol-related illnesses, road accident fatalities or crime rates. It could be argued that the lack of a significant association is due to the small sample size and insufficient variation in the data series. However, this argument is harder to justify in reference to the results on crime as this data is of relatively good quality and long time span. Furthermore,

it will be shown in the analysis in Chapter 4 that lack of variation is not driving the result as prohibition is found to have an effect on several of these indicators.

The view that governments regulate in response to efficiency considerations is consistent with no prohibition if other methods, such as taxation, are used to curtail alcohol demand. While the analysis cannot test this hypothesis directly due to data limitations, the results do indicate that prohibition is lower when state excise revenues are higher. This, however, is not a sufficient condition for the theory to hold as the result may be due to greater lobby power or a larger alcohol tax base. The analysis does find that less developed tax systems are not associated with prohibition and that, given the development of the tax system, the negative effects of alcohol consumption analysed above remain insignificant indicators of prohibition. In addition, research on alcohol demand in India, and developed countries in general, find that alcohol demand is price elastic within specific ranges and hence affected by taxation. These further mitigate the basis for prohibition on efficiency grounds and suggest that prohibition may be enacted to fulfil alternative objectives of government actors.

Prohibition is found to be associated with the electoral cycle which offers strong support for the grabbing hand view of government regulation as in this view policies are enacted to win political favour. Party identity, electorate characteristics, and political competition are unrelated to prohibition which suggests that prohibition is not enacted to reflect the preferences for paternalism of the average citizen but to capture the votes of preferred constituencies, to reflect the preferences of political actors, to extract rents from lobby groups, or to win favour with popular social movements. This is corroborated by the result that legislature characteristics are related to prohibition such that scheduled caste politicians are relatively more inclined toward prohibition policies. The result is not surprising given that SCs are more inclined to consume alcohol and hence more likely to observe the negative effects of consumption. Although female legislatures are found to be negatively associated with prohibition, this is likely to be due to effects of the desirability hypothesis and the effect of female empowerment on the preferences for a large state. Once the size of the alcohol industry is controlled for, female legislatures are significantly associated with prohibition, in line with the qualitative evidence on female politicians working with anti-liquor groups.

Distinguishing between the two main theories of opportunistic governments - the theory

of regulatory capture and the tollbooth view - is difficult. The above results reflect political economy considerations are important for alcohol prohibition enactment which lends support to the tollbooth view of government regulation. However, the analysis did not explicitly *test* the regulatory capture model. Consistent with the capture view, I find that the size of the alcohol industry is significantly and negatively related to complete prohibition policies across the whole state. The result that the industry is not association with prohibition when examining the proportion of population under prohibition is plausible given that the industry would be more affected by prohibition across the entire state due to loss of market share and the costs of relocation or closing down. The result indicates that, if regulatory capture does occur, it occurs when "extreme" policies are enacted. This strong negative association implies that the effect of lobbying by the alcohol industry, which the anecdotal evidence suggests is powerful and often successful, is difficult to counterbalance by the lobbying activities of other groups such as the anti-liquor movement. The effect of the latter could not be explicitly incorporated in the analysis but the qualitative evidence reports it is a strong proponent of prohibition policies.

Taken together, the results suggest that prohibition of alcohol results from non-alcohol producing states attempting to illicit higher central transfers. Prohibition is positively associated with the electoral cycle and occurs in states with more rural populations, who tend not to be dependent on the alcohol industry and consume relatively more alcohol compared to the urban population. This suggests that politicians may use prohibition to coalesce the voting majority to win elections in non-alcohol producing states. The limited impact on state excise and the promise of higher central transfers are key factors in propelling this argument. In addition, the second order effect of prohibition on the state excise of producing states, may also serve to win popular support.

The estimation also finds evidence of a positive mimicking effect such that as more Indian states enact prohibition, holding the concentration of the alcohol industry constant, more prohibition is enacted. It is not clear whether this effect works through shaping preferences for paternalism and the perceived efficiency of observed prohibition policy or whether this is due to increased inter-state competition for central union excise shares. The evidence from the interaction of central excise shares with proportion of states enacting prohibition

suggests that the latter may be the case. That is, states engage in strategic policy enactment to attain or maintain central excise shares as is often observed with competitive devaluations between countries or offsetting advertising between firms.

2.6 Conclusion

This chapter examined the determinants of a particular type of paternalistic policy - prohibition of alcohol in India. In doing so, it has added to the empirical literature on the economics of government regulation. The analysis finds limited support for the helping hand view of government. The results presented provide strong evidence that prohibition policies are not systematically related to the negative effects of alcohol consumption or other systemic variables which would suggest prohibition to be the most effective policy handle to curtail alcohol demand.

On the other hand, there is good reason to have a less benign perspective of government regulation as in the grabbing hand view. Prohibition is found to be related positively with the electoral cycle and appears to be driven less by the preferences of the electorate and more of specific groups which lends support for the tollbooth view of regulation. Nevertheless, it is not easy to distinguish between the latter and the theory of regulatory capture based on the analysis presented. What can be deduced is that the alcohol industry has significant influence in deterring prohibition whose effect is difficult to counteract by other groups such as women's movements or anti-alcohol movements.

Prohibition of all three types appear to be determined by similar factors. In particular, the results provide strong support that prohibition is used strategically by non-alcohol producing states to elicit central transfers. The impetus for this is politically motivated as politicians win votes by coalescing rural constituencies for prohibition with the promise of lower negative effects of alcohol and higher central finance. There are also indications that inter-state competition for central rents results in further prohibition as states attempt to maintain existing central excise shares.

The finding that prohibition is enacted not with the explicit view to curtail alcohol demand for efficiency reasons but to fulfil the objectives of politicians and bureaucrats, raises

serious questions regarding the role of the state in the economy. Given that paternalistic policies in general, and prohibition policies in particular, limit individual freedom by constraining individual choice, the above analysis provides good reasons to support a more limited role of government regulation. The observation that prohibition policies are not without their costs, such as greatly depleted state finances or larger bureaucracies, lends further credence to this view. The results also raise the issue of the effectiveness and efficiency of alcohol prohibition in reducing in alcohol consumption. It is to this which I turn to in the next chapter.

2.7 Appendix 1: Prohibition Legislation in Indian States, 1957-2001

Source: State Local Acts

ANDHRA PRADESH

1937 Andhra Pradesh (Andhra area) Prohibition Act, 1937 (10/1937)

Introduced and extended prohibition of manufacture, sale and consumption of intoxicating liquors and drugs in the Andhra area of the state of Andhra Pradesh.

1955 Andhra Pradesh Prohibition Act, 1955 (17 of 1955) 743

Extended prohibition of manufacture, sale and consumption of intoxicating liquors and drugs in 9 districts of the state of Andhra Pradesh. These are the districts of Chittoor, Cuddapah, Anantapur, Kurnool, Guntur, Nellore, Visakhapatnam, Srikulam, East Godavari, West Godavari, and Krishna.

1968 Andhra Pradesh Excise Act, 1968 (Act 17 of 1968)

Repealed prohibition on 1st November 1969 and introduced rules and regulations for the taxation, production and sale of alcohol.

1994 Andhra Pradesh Prohibition Ordinance, 1994

Prohibited the selling, buying, possessing and consumption of arrack but not IMFL or Indian liquor.

1995 Andhra Pradesh Prohibition (Amendment) Act, 1995 (35 of 1995) 744

Prohibited the sale, manufacture and consumption of all alcohol from 15th January 1995.

1997 Andhra Pradesh Prohibition (Amendment) Act, 1997

Repealed prohibition on all alcohol except arrack.

ASSAM

1952 The Assam Liquor Prohibition Act, 1952

Prohibited the possession, consumption and manufacture of liquor and smuggling thereof into the Barpeta sub-division and other areas of the state.

1963 The Assam Liquor Prohibition (Amendment) Act, 1963

Amended the 1952 Act to allow permits for foreigners and clarify what a state of drunkenness described.

1994 The Assam Liquor Prohibition (Amendment) Act, 1994

Lifted any prohibition on all alcohol.

BIHAR

1938 The Bihar Prohibition of Intoxicants Ordinance 1980 including "Regulation of Molasses and Sugarcane Supply and Purchase Act"

Outlined a policy of temperance via control over molasses and sugar-cane production and sale and on the alcohol industry via regulations and restricted capacity rules. There was no prohibition of consumption and production

GUJARAT

1949 Prohibition Act, Bombay, 1949

Prohibited manufacture, sale and consumption of all liquors in Gujarat.

1963 The Bombay Prohibition (Gujarat Amendment) Act, 1963

Amends the 1949 Act to close loopholes to reinforce complete prohibition.

1977 The Bombay Prohibition (Gujarat Amendment) Ordinance, 1977

Amends the 1949 Act to close loopholes to reinforce complete prohibition.

HARYANA

1914 Punjab Excise Act, 1914 (Act 1 of 1914) amended in 1948

Introduced complete prohibition in the district of Rohtak on 2/10/1948.

1967 Punjab Excise Act, 1914 (Act 1 of 1914) amended in 1967

Lifted prohibition in Rohtak.

1996 Punjab Excise Act, 1914 (Act 1 of 1914) amended in 1996 (22/96)

Introduced complete prohibition on production and consumption of all alcohol types in entire state.

1997 Punjab Excise Act, 1914 (Act 1 of 1914) amended in 1998 (20/98)

Lifted complete prohibition on production and consumption of all alcohol types in entire state.

JAMMU & KASHMIR

No Prohibition Legislation.

KARNATAKA

1948 Mysore Prohibition Act, 1948 (Act 37 of 1948)

Enforced prohibition in selected districts in Mysore State over 1938-1961. These districts include Bangalore, South Kanara, Bellary, Chiradurg, Tumkur, Kolar, Shimoga, Chikmagalur, Darwar, North Nakara, Bijapur, Belgaum, Hassan, Coorg, Bidar, Mysore, Mandya.

1961 Mysore Prohibition Act, 1961 (Mysore Act 17 of 1962)

Relaxed prohibition in some districts.

1965 The Mysore Excise Act, 1965 (Act 21 of 1966)

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.

KERALA

1950 The Prohibition Act, 1950 (Act 13 of 1950)

Enforced total prohibition across districts of Kerala from 25th November 1949. These districts include Kozhikode, Palghat, Cannanore, Trivandrum, Quilon, Ernakulam, Trichur.

1967 Notification no. 7519/G3/67/RD

Repealed prohibition in all local areas.

1996 The Prohibition Act, 1950 (Act 13 of 1950) Amended in 1996

Introduced arrack prohibition on 1st April 1996.

MADHYA PRADESH

1938 The Central Provinces Prohibition Act, 1938 (Act 8 of 1938)

Enforced prohibition in some districts of the state. These include Sagar, Damch, Narsinghpur, Khandwa, Hoshangabad, Vidisha, Raipur, Bilaspur, Durg, Jabalpur, Bhilsa.

1961 The Madhya Pradesh Prohibition (Amendment) Act, 1961

Provided compulsory jail imprisonment for liquor offences.

1964 The Madhya Pradesh Prohibition (Amendment) Act, 1964

Lifted prohibition in all districts. (Prohibition does exist in selected villages/taluks/districts for example in Jhanbua district but this is not legislated prohibition but self imposed).

MAHARASHTRA

1949 The Bombay Prohibition Act, 1949

Imposed prohibition in the whole state of Bombay.

1952 The Bombay Prohibition (Amendment) Act, 1952

Strengthened the 1949 Act and covered loop-holes.

1953 The Bombay Prohibition (Amendment) Act, 1953

Strengthened the 1949 Act and covered loop-holes.

1954 The Bombay Prohibition (Amendment) Act, 1954

Disallowed alteration of denatured spirits to produce intoxicating liquor.

1959 The Bombay Prohibition (Extension and Amendment) Act, 1959

Extended the 1949 prohibition Act to the rest of the State of Bombay to repeal any corresponding laws (e.g. Abkari laws) in force in those parts of the state. This is mainly to take into account the states reorganisation which occurred in 1956.

1963 Notification, 1963

Lifted complete prohibition and rationalized prohibition where certain types of alcohol were allowed.

1968 Notification, April 25th 1968

Allowed vary low alcohol content drinks to be produced/ consumed. (Not arrack or any form of toddy).

ORISSA

1956 The Orissa Prohibition Act, 1956

Introduced and extended the prohibition of manufacture, sale and consumption of intoxicating liquors and drugs in the State of Orissa on 1st April, 1956 in selected districts. These districts are Cuttack, Balasore, Puri, Ganjam, and Koraput.

1968 The Orissa Prohibition Laws (Amendment) 1968

Lifted complete prohibition in whole state.

1994 The Orissa Prohibition Laws (Amendment) 1994

Imposed complete prohibition in whole state.

1995 The Orissa Prohibition Laws (Amendment) 1995

Lifted complete prohibition in whole state.

PUNJAB

1914 Punjab Excise Act, 1914 (Act 1 of 1914) amended in 1948

Introduced complete prohibition in the district of Rohtak on 2/10/1948 which was transferred to Haryana in 1965.

RAJASTHAN

1950 The Rajasthan Excise Act, 1950

Outlined a uniform law relating to the import, export, transport, manufacture, sale and possession of intoxicating liquor and of intoxicating drugs. Prohibition was enacted in Abu taluk of Sirodhi district.

1969 The Rajasthan Prohibition Act, 1969

Prohibited liquor in many districts of the state over 1969-1976. These districts are Dungarpur, Banswara, Sirodhi, Udaipur, Barmer, Jalore, Jaisalmer, Nagaur.

1976 The Rajasthan Prohibition (Amendment) Act, 1976

Lifted prohibition in the prohibited districts and introduced government regulation of liquor via the Rajasthan Excise (Amendment) Act, 1976 (Act 30 of 1976).

1977 Notifications, 12th September 1977

Enforced prohibition from 1st October 1977 in Tonk and Bundi districts, Kishanganj and Shahabad tehsils of Kota district, Pratapgarh tehsil of Chittorgarh district and Salumbar tehsil of Udaipur district.

1977 Notifications, October 20, 1977

Enforced prohibition from 1st December 1977 in Jahajpur and Mandalgarh tehsils of Bhilwara district, and Bali tehsil of Pali district.

1978 The Rajasthan Prohibition (Amending and Extending) Act, 1978

Extended prohibition to the Abu area due to the 1956 states reorganization.

1979 Notifications, 31st March, 1979

Enforced prohibition from 1st April 1979 in Jhunjhunu, Sikar, Bhilwara, Jhalawar, Sawai-Madhopur, Altar and Bharatpur districts.

1979 Notifications, 31st March, 1979

Enforced prohibition from 2nd September 1979 in Chittorgarh, Ajmer, and Kota districts.

1979 Notifications, 31st March, 1979

Enforced prohibition from 1st April 1980 in Ganganagar, Japer, Udaipur districts.

1981 The Rajasthan Prohibition Act Repealing Act, 1981

Repealed the 1969 Prohibition Act from 11th August 1981 and revived the Rajasthan Excise Act, 1950.

TAMIL NADU

1937 Madras Prohibition Act, 1937

Introduced prohibition in Madras.

1970 The Tamil Nadu Prohibition (Amendment) Act, 1970

Suspended prohibition of production and introduced regulation of production via licenses.

1971 The Tamil Nadu Prohibition (Suspension of Operation) Act, 1971

Repealed prohibition and suspended Prohibition Act 1937.

1973 The Tamil Nadu Prohibition (Suspension of Operation) Amendment Act, 1973

Introduced the Prohibition Act 1937 for toddy.

1974 The Tamil Nadu Prohibition (Suspension of Operation) Amendment Act, 1974

Repealed the 1973 Act.

1978 The Tamil Nadu Prohibition (Amendment) Act, 1978

Enforced prohibition on 1st October 1978.

1979 The Tamil Nadu Prohibition (Amendment) Act, 1979

Enforced stricter rules for prohibition on 3rd October 1978.

1981 The Tamil Nadu Prohibition (Amendment) Act, 1981

Repealed prohibition on 22nd April 1981 and issued guidelines for production of liquor in the Tamil Nadu Prohibition (Amendment) Act, 1982 (Act 42 of 1982).

1983 The Tamil Nadu Prohibition (Second Amendment) Act, 1983

Transferring bulk of production of arrack and IMFL from the private sector to a state controlled cooperation. This led to a public auction-cum-tender system for the sale of alcohol.

1985 The Tamil Nadu Prohibition (Amendment) Act, 1985

Transferring retail rights to the State Cooperation due to collusion of retailers under the previous regulations.

1986 The Tamil Nadu Prohibition (Second and Third Amendment) Act, 1986

Introduced prohibition with respect to arrack and toddy throughout the state from 1st January 1987.

1990 The Tamil Nadu Prohibition (Amendment) Act, 1990

Abolished Prohibition of arrack or "country liquor" on the 7th March 1990 and gives the State Cooperation sole license to produce it.

1993 The Tamil Nadu Prohibition (Amendment) Act, 1993

Prohibition of arrack from 16th July 1991. This act omits the reference to arrack in the Prohibition Act of 1937.

UTTAR PRADESH

1947 Uttar Pradesh Intoxicant Prohibition Rules 1947

Guidelines for prohibition in selected districts: Etah, Mainpuri, Budaun, Farrukabad, Sultanpur, Pratapgarh, Jaunpur, Unnao, Kanpur, Rae Bareli, Fatehpur, Saharanpur, Dehra Dun, Mathura.

1969 Notification 28th March 1969

Prohibition from 1st April 1969 in Chamoli, Pithoragarh and Uttarkashi districts.

1972 Notification 22nd July 1972

From 22nd July 1972, prohibition of import, export, transport, and possession of liquor in Chamoli, Pithoragarh and Uttarkashi districts and the municipal areas of Hardwar, Brindavan and Rishikesh.

1977 Notification 1st October 1977

From 1st October 1977, prohibition of import, export, transport or possession of liquor in clubs.

1978 Notification 30th March 1978

From 1st April 1978, prohibition in Kanpur, Unnao, Lucknow, Bara Banki, Dehra Dun, Nainital, Almora districts.

1978 Notification 31st March 1978

From 1st April 1978, prohibition of foreign liquor in hostels, restaurants, cafes, hotels bars, shops of arrated water and foodstores.

1978 Notification 16th October 1978

From 1st April 1978, prohibition of import, transport, possession in and export of fermented toddy.

1980 Notification 20th December 1980

Amended the Excise Act to imposed prohibition on certain days e.g. Holi, Dewali, Independence day (August 15th), Mahatma Gandhi's birthday (October 25th).

1991 Notification 20th March 1991

From 1st April 1991, lifted prohibition of IMFL in Chamoli and Uttarkashi districts.

WEST BENGAL

No prohibition legislation. Alcohol legislation falls under the Bengal Excise Act, 1909 (Act 5 of 1909).

2.8 Appendix 2: Data Appendix

The data used in this chapter come from a wide variety of sources. They cover the sixteen main Indian states: Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Jammu and Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal. Haryana split from the state of Punjab in 1965 and is

treated as a separate observation from this date on. The time span for each variable varies due to availability as illustrated in Table 2.2. In general the period covers 1957-2001. The data collection has been greatly aided by Besley and Burgess (2000, 2002, and 2004) who have compiled data on political, economic, and social variables on Indian states for this period. The prohibition variable has been described in detail in the text and will not be covered here.

General Variables

Drought and flood are dummy variables for periods when annual average rainfall is two standard deviations above or below the state specific rainfall mean 1958-1992. Rainfall data are from the Statistical Abstract of India, Government of India.

Female Literacy Rate is the proportion of literate females (aged 7 and above) from the Census of India for 1961, 1971, 1981, 1991, and 2001. It is interpolated between census years and sourced from the Census of India, Registrar General and Census Commissioner, Office of the Registrar General, Government of India.

Flood Damage is statewise data on the value of crops affected by floods measured in rupees from the Central Water Commission, Government of India.

Food Grain Production is total food grain production measured in tonnes from the Bulletin on Food Statistics, Ministry of Food and Agriculture, Directorate of Economics and Statistics, Government of India. It is expressed in real per capita terms using the price deflator and population figures.

Price deflators used are the Consumer Price Index for Agricultural Labourer (CPIAL) and Consumer Price Index fro Industrial Workers (CPIIW). These are sourced from the Indian Labour Handbook, Indian Labour Journal, Indian Labour Gazette, and the Reserve Bank of India Report on Currency and Finance.

Population data come from the 1951, 1961, 1971, 1981, 1991, and 2001 (provisional) censuses [Census of India, Registrar General and Census Commissioner, Government of India] and have been interpolated between census years by urban and rural sectors.

Population density is interpolated total population divided by total land area of each state from the Census Atlas of India, Registrar General and Census Commissioner, Officer of the Registrar General, Government of India.

Proportion SC/ST Population is the proportion of Scheduled Caste and Scheduled Tribe persons of total population from the Census of India for 1961, 1971, 1981, 1991, and 2001. It is interpolated between census years and sourced from the Census of India, Registrar General and Census Commissioner, Office of the Registrar General, Government of India.

Proportion States with Prohibition measures the ratio of Indian states with any type of prohibition in the previous year excluding the state in question.

Proportion urban population is a measure of how urbanized a size is and is constructed from the total and urban population data from the census. It is therefore interpolated between 1951, 1961, 1971, 1981, 1991, and 2001 census years. The data source is Census of India, Registrar General and Census Commissioner, Office of the Registrar General, Government of India.

State income is from estimates of the State Domestic Product published by the Department of Statistics, Department of Statistics, Ministry of Planning, Government of India. This is deflated using the price deflator.

Political Variables

Election dummy is a variable that is equal to one in years with a state legislative election and zero otherwise. The data is from the Election Commission of India, Government of India.

Election instrument is a dummy variable constructed from electoral rules such that starting from the first year when state elections were held every fifth year is defined as an election year. The variable is similar to that used by Khemani (2004).

Number of Parties Contesting is the total (registered and unregistered) number of parties contesting in the state elections by state. The data is from the Election Commission of India, Government of India.

Number of Contestants Per Seat is the total number of contestants competing in the state elections by state divided by the number of contested seats. The data is from the Election Commission of India, Government of India.

Political Competition is defined as minus the absolute difference between the proportion of seats occupied by the party in power and the proportion occupied by its main competi-

tor(s). A larger value indicates greater political competition. Data on party seats is from the Election Commission of India, Government of India.

Proportion seats by party is the proportion of seats in the state legislature by party groupings as follows: (i) Congress Party (Indian National Congress + Indian Congress Socialist + Indian National Congress URS + Indian National Congress Organization), (ii) Janata Party (Janata Party + Janata Dal + Lok Dal Party), (iii) Hard Left parties (Communist Party of India + Communist Party of India Marxist), (iv) Soft Left parties (Socialist Party + Praja Socialist Party), (v) Hindu parties (Bhartiya Janata Party + Bhartiya Jana Sangh), (vi) Regional parties (State/regional-specific parties), (vii) Other parties (residual national and state registered and non-registered parties), and (ix) Muslim parties (parties with Islamic/Muslim party names). The data is from the Election Commission of India, Government of India.

Proportion Female Seats is the proportion of female seats in the state legislature.

Proportion SC/ST Seats is the proportion of Scheduled Caste and Scheduled Tribe seats in the state legislature.

Proportion SC/ST Female Seats is the proportion of Scheduled Caste and Scheduled Tribe female seats of total Scheduled Caste and Scheduled Tribe seats in the state legislature.

Turnout is turnout in state elections and is held constant between elections. The data is from the Election Commission of India, Government of India.

Industry Data

Labour regulation is a variable to measure pro-worker versus pro-employer labour regulation complied by Besley and Burgess (2004). They code state amendments to the Industrial Disputes Act as 1=pro-worker, 0=neutral, -1=pro-employer and accumulate this over the period to generate the labour regulation measure.

Number of Alcohol Factories is the total number of registered breweries, distilleries, and wine producers in the state. The data is sourced from the Annual Survey of Industries and Census of Industries (Central Statistical Office, Industrial Statistics Wing), Department of Statistics, Ministry of Planning and Programme Implementation, Government of India.

Number of Manufacturing Factories is the total number of registered manufacturing factories as defined by the Factories Act of 1948 which refers to registered manufacturing

as firms with ten or more employees with power or twenty or more employees without power. The data is sourced from the Annual Survey of Industries and Census of Industries (Central Statistical Office, Industrial Statistics Wing), Department of Statistics, Ministry of Planning and Programme Implementation, Government of India.

Proportion Alcohol Factories is the proportion of alcohol factories within each state of the total number of alcohol factories in India. As such, it is a measure of the relative concentration of the alcohol industry across states.

Public Finance Variables

Central Excise Share is the ratio of central union excise to total state revenue. The data is sourced from the Public Finance Statistics (Ministry of Finance, Government of India) and the Report on Currency and Finance, Reserve Bank of India.

Proportion Central Grants is the ratio of central grants to total state revenue. The data is sourced from the Public Finance Statistics (Ministry of Finance, Government of India) and the Report on Currency and Finance, Reserve Bank of India.

Proportion Non Tax Revenue is the ratio of state non-tax revenue to total state revenue. The data is sourced from the Public Finance Statistics (Ministry of Finance, Government of India) and the Report on Currency and Finance, Reserve Bank of India.

Proportion State Excise is the ratio of state excise revenue to total state revenue. State excise includes receipts from taxes on potable alcohol; commercial and denatured spirits and medicated wines; medicinal and toilet preparations containing alcohol; opium, hemp, and other drugs; and fines and confiscations. The data is sourced from the Public Finance Statistics (Ministry of Finance, Government of India) and the Report on Currency and Finance, Reserve Bank of India.

Proportion State Sales Tax is the ratio of state sales tax revenue to total state revenue. The data is sourced from the Public Finance Statistics (Ministry of Finance, Government of India) and the Report on Currency and Finance, Reserve Bank of India.

Ratio Tax Revenue to GDP is the ratio of state total tax revenue to state income. The data is sourced from the Public Finance Statistics (Ministry of Finance, Government of India) and the Report on Currency and Finance, Reserve Bank of India.

Health Variables

Log Accidental Poisoning Deaths is the log of accidental deaths from poisoning sourced from the Accidental Deaths and Suicides in India, National Crime Records Bureau, Government of India.

Log Liver Cirrhosis Deaths is the log of number of deaths from liver cirrhosis sourced from the Statistical Abstract of India and Vital Statistics of India, Central Statistical Office, Government of India.

Log Liver Disease Deaths is the log of number of liver disease deaths sourced from the Statistical Abstract of India and Vital Statistics of India, Central Statistical Office, Government of India.

Log Number Treated Liver Disease is the log of treated cases of liver disease sourced from the Statistical Abstract of India, Central Statistical Office, Government of India.

Log Road Accident Deaths is the log of road accident deaths sourced from the Accidental Deaths and Suicides in India, National Crime Records Bureau, Government of India.

Log Spurious Liquor Deaths is the log of deaths from spurious liquor poisoning sourced from the Accidental Deaths and Suicides in India, National Crime Records Bureau, Government of India.

Crime Data

Proportion Burglaries is the ratio of reported burglaries to total crimes sourced from Crime in India, National Crime Records Bureau, Government of India.

Proportion Dacoity is the ratio of reported cases of dacoity to total crimes sourced from Crime in India, National Crime Records Bureau, Government of India.

Proportion Murders is the ratio of reported murders to total crimes sourced from Crime in India, National Crime Records Bureau, Government of India.

Proportion Rapes is the ratio of reported rapes to total crimes sourced from Crime in India, National Crime Records Bureau, Government of India.

Proportion Robberies is the ratio of reported robberies to total crimes sourced from Crime in India, National Crime Records Bureau, Government of India.

Proportion Thefts is the ratio of reported thefts to total crimes sourced from Crime in India, National Crime Records Bureau, Government of India.

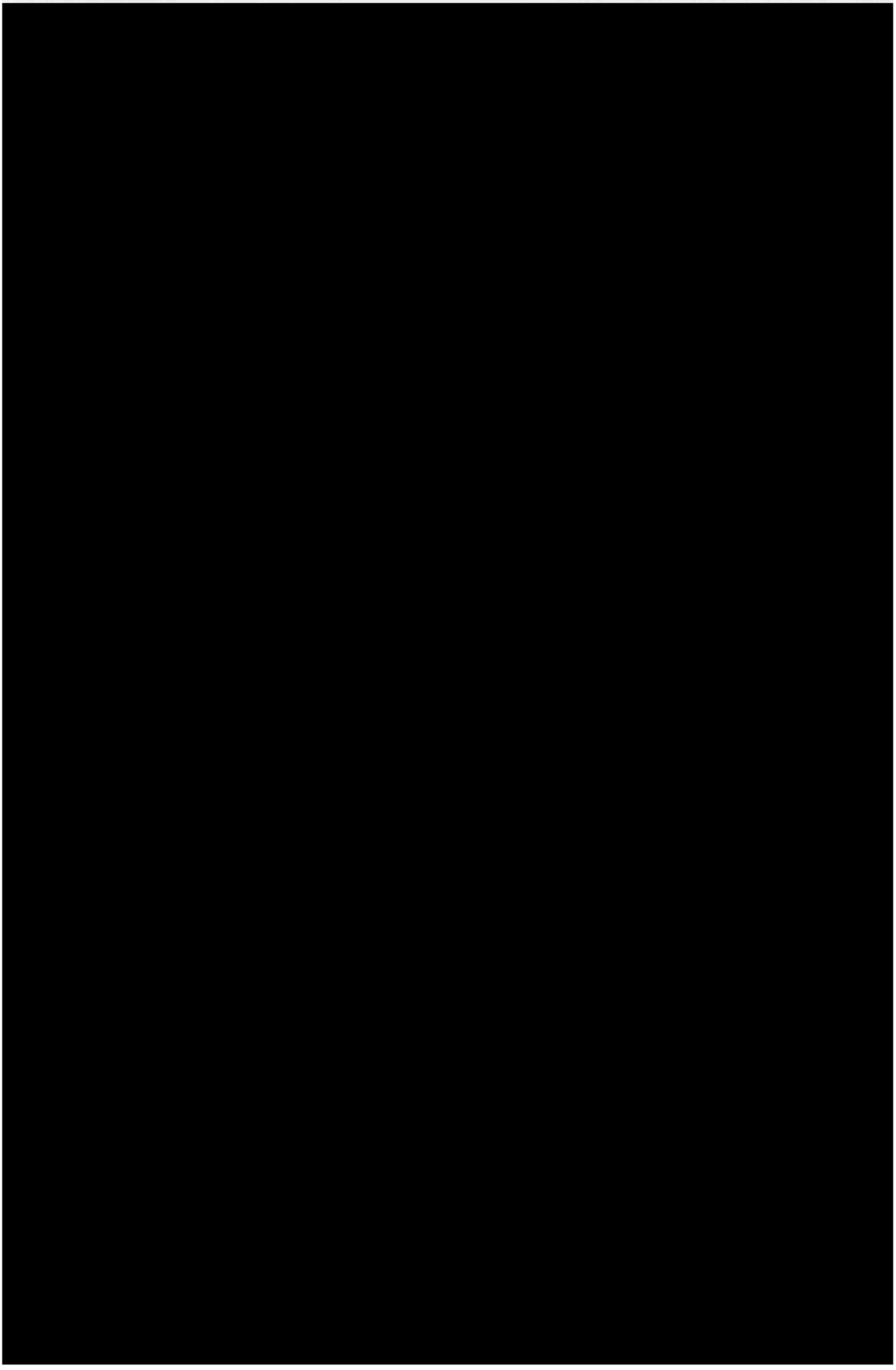

Figure 2-2: Proportion Population Under Arrack Population

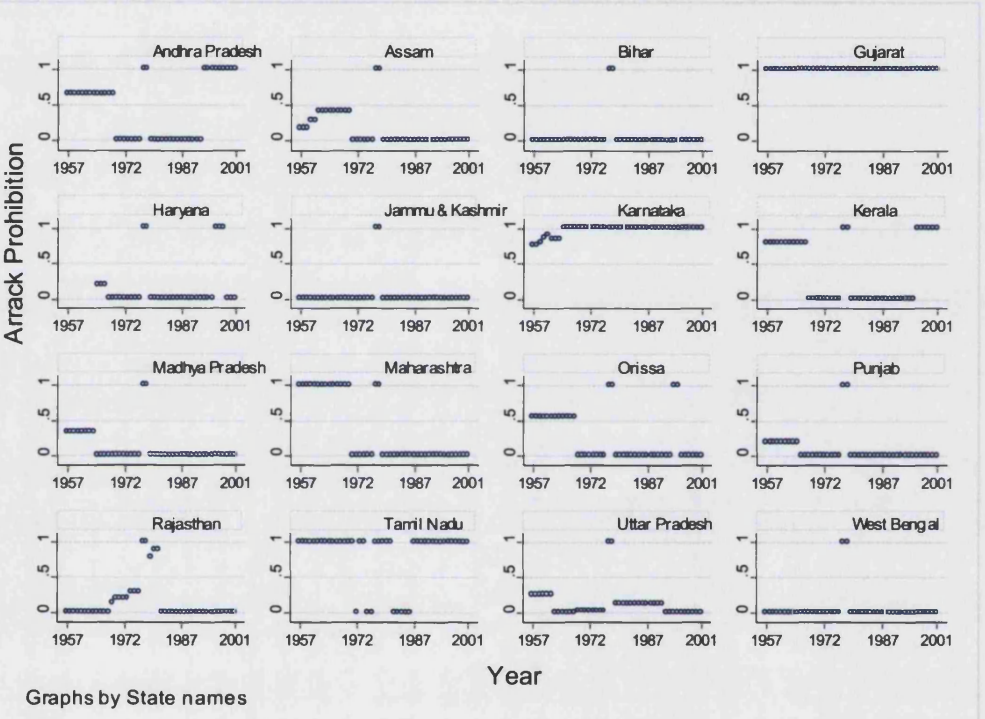

Table 2.1: Summary of Prohibition Variables

State	Proportion of Population Under: Complete Prohibition		Arrack Prohibition		Partial Prohibition	
	Mean	**S.d.**	**Mean**	**S.d.**	**Mean**	**S.d.**
Andhra Pradesh	0.30	0.38	0.43	0.43	0.13	0.34
Assam	0.15	0.25	0.15	0.25	0.00	0.00
Bihar	0.04	0.21	0.04	0.21	0.00	0.00
Gujarat	1.00	0.00	1.00	0.00	0.00	0.00
Haryana	0.15	0.34	0.15	0.34	0.00	0.00
Jammu & Kashmir	0.04	0.21	0.04	0.21	0.00	0.00
Karnataka	0.21	0.37	0.97	0.07	0.76	0.43
Kerala	0.24	0.38	0.37	0.44	0.13	0.34
Madhya Pradesh	0.10	0.23	0.10	0.23	0.00	0.00
Maharashtra	0.36	0.48	0.36	0.48	0.00	0.00
Orissa	0.24	0.34	0.24	0.34	0.00	0.00
Punjab	0.08	0.21	0.08	0.21	0.00	0.00
Rajasthan	0.14	0.29	0.14	0.29	0.00	0.00
Tamil Nadu	0.44	0.50	0.82	0.39	0.38	0.49
Uttar Pradesh	0.11	0.21	0.11	0.21	0.00	0.00
West Bengal	0.04	0.21	0.04	0.21	0.00	0.00
Total	**0.23**	**0.39**	**0.32**	**0.44**	**0.09**	**0.28**

Table 2.2: Summary of Main Variables

Variables	Mean	S.d.	Obs	Years
Log State Income Per Capita	-2.21	0.40	637	1960-2000
Proportion Urban Population	0.22	0.08	692	1958-2001
Congress Party	0.47	0.25	702	1957-2001
Janata Party	0.09	0.18	702	1957-2001
Hard Left Parties	0.07	0.14	702	1957-2001
Soft Left Parties	0.02	0.04	702	1957-2001
Hindu Parties	0.07	0.12	702	1957-2001
Regional Parties	0.14	0.25	702	1957-2001
Other Parties	0.07	0.10	702	1957-2001
National Parties	0.72	0.23	702	1957-2001
Muslim Parties	0.01	0.03	702	1957-2001
Year of Election Dummy	0.23	0.42	702	1957-2001
Year of Election Instrument	0.20	0.40	702	1957-2001
Political Competition	0.38	0.14	702	1957-2001
Number of Parties Contesting	16.52	12.01	702	1957-2001
Number of Contestants Per Seat	6.96	4.49	702	1957-2001
Proportion Female Seats	0.04	0.02	702	1957-2001
Female Literacy Rate	29.04	17.33	646	1961-2001
Proportion SC/ST Seats	0.21	0.08	702	1957-2001
Proportion SC Seats	0.14	0.05	702	1957-2001
Proportion ST Seats	0.07	0.08	702	1957-2001
Proportion SC/ST Female Seats	0.04	0.04	626	1961-2001
Proportion SC Female Seats	0.04	0.05	626	1961-2001
Proportion ST Female Seats	0.03	0.08	626	1961-2001
Proportion SC Population	0.15	0.06	548	1958-1992
Proportion ST Population	0.07	0.08	548	1958-1992

Table 2.2 Cont: Summary of Main Variables

Variables	Mean	S.d.	Obs	Years
Number of Alcohol Factories	9.52	11.57	648	1957-1997
Number of Manufacturing Factories	4545.54	4790.26	545	1957-1995
Proportion Alcohol Factories	0.05	0.05	648	1957-1997
Proportion States with Prohibition	0.31	0.26	712	1957-2001
Ratio Tax Revenue to GDP	0.09	0.03	640	1960-2000
Proportion State Excise of Revenue	0.06	0.04	706	1957-2001
Proportion State Sales Tax of Revenue	0.18	0.08	706	1957-2001
Proportion Central Grants of Revenue	0.18	0.12	706	1957-2001
Proportion Non-Tax Revenue of Revenue	0.37	0.13	706	1957-2001
Central Excise Share	0.06	0.04	674	1957-1999
Log Road Accident Deaths	7.08	1.17	480	1970-1999
Log Accidental Poisoning Deaths	5.67	1.54	480	1970-1999
Log Spurious Liquor Deaths	3.39	1.28	237	1984-1999
Log Number Treated Liver Disease	9.49	1.27	337	1957-1985
Log Liver Disease Deaths	4.81	1.27	335	1957-1985
Log Liver Cirrhosis Deaths	5.41	1.48	192	1973-1993
Proportion Rapes of Total Crime	0.01	0.01	304	1983-2001
Proportion Murders of Total Crime	0.02	0.02	709	1957-2001
Proportion Thefts of Total Crime	0.25	0.10	709	1957-2001
Proportion Burglaries of Total Crime	0.13	0.10	709	1957-2001
Proportion Robberies of Total Crime	0.01	0.01	709	1957-2001
Proportion Dacoity of Total Crime	0.01	0.01	709	1957-2001

Table 2.3: Prohibition and State Controls

	Complete Prohibition			Proportion Population Under Any prohibition			Partial Prohibition		
	(1) GLS AR(1)	(2) GLS AR(1)	(3) GLS AR(1)	(4) GLS AR(1)	(5) GLS AR(1)	(6) GLS AR(1)	(7) GLS AR(1)	(8) GLS AR(1)	(9) GLS AR(1)
Log State Income Per Capita	-0.040 (0.784)		-0.030 (0.595)	0.003 (0.046)		0.005 (0.082)	0.010 (0.408)		0.009 (0.366)
Proportion Urban Population		-2.174 (2.380)	-1.986 (2.071)		-0.788 (0.787)	-0.386 (0.378)		0.141 (0.248)	0.275 (0.637)
Constant	0.103 (0.667)	0.768 (2.786)	0.648 (2.103)	0.385 (2.663)	0.619 (2.173)	0.492 (1.542)	0.190 (1.474)	0.183 (0.694)	0.112 (0.654)
Chi2 of Controls Prob > chi2			5.04 (0.080)			0.14 (0.931)			0.62 (0.735)
Observations	637	676	637	637	676	637	637	676	637

Notes: Absolute value of z statistics in parentheses. All models include state and year effects. All right hand-side variables lagged by one year. The sample size is smaller for models including state income per capita as figures are available from 1960-2000 and there are 6 reports to date for 2000.

Table 2.4: The Electoral Cycle

	Proportion Population Under Complete Prohibition					
	(1) GLS AR(1)	(2) GLS AR(1)	(3) GLS (IV)	(4) GLS (IV)	(5) GLS AR(1)	(6) GLS AR(1)
Election Year Dummy	0.069	0.076	0.319	0.354		
	(4.224)	(4.532)	(6.916)	(6.357)		
Pre-Election Year Dummy					0.020	0.020
					(1.177)	(1.143)
Proportion Urban Population	-2.531	-3.219	-4.103	-4.019	-2.566	-3.058
	(2.348)	(2.909)	(2.275)	(2.679)	(2.399)	(2.778)
Constant	0.947	0.657	1.257	0.570	0.952	0.711
	(4.412)	(2.107)	(3.607)	(1.318)	(4.475)	(2.281)
Party Controls		Yes		Yes		Yes
Observations	672	672	672	672	672	672

Notes: Absolute value of z statistics in parentheses. All models include state and year effects. Party controls include share of seats by party groups as in Column 2 Table 2.5. GLS (IV) uses an instrument constructed from electoral rules such that starting from the first year when state elections were held every fifth year is defined as an election year.

Table 2.5: Political Parties

Party Grouping	Proportion Population Under Complete Prohibition (1) GLS AR(1)	(2) GLS AR(1)	(3) OLS	(4) GLS AR(1)	(5) GLS AR(1)
National Parties	-0.145				
	(0.948)				
Regional Parties	-0.174	-0.172	0.484	-0.186	0.004
	(1.166)	(1.123)	(1.490)	(1.224)	(0.027)
Congress Party		-0.148	0.611	-0.146	-0.004
		(0.938)	(1.801)	(0.938)	(0.025)
Janata Party		-0.131	0.710	-0.124	0.002
		(0.796)	(1.784)	(0.768)	(0.011)
Hard Left Parties		-0.127	1.030	-0.176	-0.063
		(0.713)	(2.391)	(0.999)	(0.378)
Soft Left Parties		-0.174	0.842	-0.094	0.019
		(0.629)	(0.959)	(0.346)	(0.112)
Hindu Parties		-0.163	0.659	-0.142	0.008
		(0.946)	(1.612)	(0.832)	(0.049)
Muslim Parties				-2.040	
				(3.379)	
Other Parties	-0.240	-0.252	-0.054	-0.196	
	(1.311)	(1.301)	(0.127)	(1.027)	
Proportion Urban	-2.371	-2.304	-3.739	-2.306	-2.420
Population	(2.758)	(2.627)	(2.565)	(2.677)	(2.620)
Constant	0.967	0.951	0.623	0.953	0.836
	(3.307)	(3.211)	(1.522)	(3.265)	(2.608)
Prob>Chi2 of Parties	0.453	0.884	0.005	0.117	0.676
Observations	672	672	672	672	667

Notes: Absolute value of z statistics in parentheses. All models include state and year effects. All right hand-side variables lagged by one election. OLS estimator uses robust standard errors clustered at the state level. Column 4 refers to party of the Chief Minister.

Table 2.6: Political Competition

	Proportion Population Under Complete Prohibition					
	(1) GLS AR(1)	(2) GLS AR(1)	(3) GLS AR(1)	(4) GLS AR(1)	(5) GLS AR(1)	(6) GLS AR(1)
Political competition	0.012	0.014				
	(0.341)	(0.404)				
Number of Parties Contesting			0.001	0.001		
			(0.435)	(0.520)		
Number of Contestants Per Seat					-0.001	-0.001
					(0.068)	(0.150)
Proportion Urban Population	-1.798	-1.765	-1.749	-1.695	-2.389	-2.445
	(2.029)	(2.102)	(1.953)	(1.988)	(2.562)	(2.689)
Constant	0.645	0.736	0.617	0.696	0.823	0.968
	(2.462)	(2.592)	(2.297)	(2.382)	(2.903)	(3.119)
Party Controls		Yes		Yes		Yes
Observations	632	632	632	632	632	632

Notes: Absolute value of z statistics in parentheses. All models include state and year effects. All right hand-side variables lagged by one election. Party controls include share of seats by party groups as in Column 2 Table 2.5.

Table 2.7: Female Politicians

	Proportion Under Complete Prohibition		**Population**		**Proportion Female Seats**	
	(1) GLS AR(1)	(2) GLS AR(1)	(3) GLS (IV)	(4) GLS (IV)	(5) IV 1st Stage	(6) IV 1st Stage
Proportion Female Seats	-0.048 (0.163)	-0.038 (0.115)	-16.786 (2.836)	-20.795 (2.318)		
Female Literacy Rate					0.001 (3.32)	0.001 (2.58)
Proportion Urban Population	-2.252 (2.473)	-2.321 (2.656)	-3.690 (2.555)	-3.792 (2.284)	-0.108 (1.44)	-0.113 (1.55)
Constant	0.790 (2.880)	0.952 (3.231)	2.029 (3.610)	0.696 (1.114)	0.041 (1.87)	0.002 (0.08)
Party Controls		Yes		Yes		Yes
Observations	672	672	628	628	628	628

Notes: Absolute value of z statistics in parentheses. All models include state and year effects. All right hand-side variables lagged by one election. Party controls include share of seats by party groups as in Column 2 Table 2.5. GLS IV was carried out using the female literacy rate as the instrument.

Table 2.8: Scheduled Caste and Scheduled Tribe Politicians

	Proportion Population Under Complete Prohibition						
Proportion	(1) GLS AR(1)	(2) GLS AR(1)	(3) GLS AR(1)	(4) GLS AR(1)	(5) GLS AR(1)	(6) GLS AR(1)	(7) GLS AR(1)
SC/ST Seats	0.957						
	(1.995)						
SC Seats		3.249	3.465	2.871			
		(3.739)	(3.943)	(3.366)			
ST Seats		0.960	0.608				
		(1.700)	(0.894)				
SC/ST Female Seats					-0.160		
					(0.840)		
SC Female Seats						-0.071	-0.092
						(0.486)	(0.629)
ST Female Seats						-0.169	
						(1.267)	
SC Population			0.001				
			(0.124)				
ST Population			0.001				
			(1.028)				
Urban Population	-2.596	-2.278	-4.275	-1.939	-0.675	-0.782	-0.684
	(3.034)	(2.817)	(3.139)	(2.452)	(0.914)	(1.065)	(0.927)
Constant	0.783	0.359	0.631	0.408	0.447	0.460	0.440
	(2.632)	(1.161)	(1.892)	(1.312)	(1.769)	(1.831)	(1.742)
Party Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	670	670	542	670	610	610	610

Notes: Absolute value of z statistics in parentheses. All models include state and year effects. All right hand-side variables lagged by one election. Party controls include share of seats by party groups as in Column 2 Table 2.5. Sample size is smaller in Column 3 as total SC/ST population is available up to 1992.

Table 2.9: Alcohol Industry

	Proportion Complete Prohibition			Alcohol Factories	Complete Prohibition Across Whole State		
	(1) GLS AR(1)	(2) GLS (IV)	(3) GLS (IV)	(4) GLS (IV) 1st Stage	(5) GLS (IV)	(6) GLS (IV)	(7) GLS (IV)
Alcohol Factories	-0.002 (1.771)	-0.014 (1.361)			-0.030 (2.545)		
Manufacturing Factories			-0.001 (0.821)			-0.001 (1.271)	
Prop Alcohol Factories							-10.900 (1.994)
Labour Regulation				1.855 (3.49)			
Prop Urban Population	-2.175 (1.992)	-1.303 (0.376)	0.381 (0.059)	334.019 (10.92)	5.374 (1.349)	10.825 (0.949)	6.105 (1.123)
Constant	0.967 (2.857)	0.518 (0.630)	0.334 (0.722)	-73.950 (6.970)	-0.747 (0.790)	0.168 (0.205)	-0.287 (0.285)
Party Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	624	596	533	596	596	533	596

Notes: Absolute value of z statistics in parentheses. All models include state and year effects. All right hand-side variables lagged by one election. Party controls include share of seats by party groups as in Column 2 Table 2.5.
Labour regulation used in the GLS (IV) measures pro-worker versus pro-employer labor regulation as complied by Besley and Burgess (2004). They code state amendments to the Industrial Disputes Act as 1=pro-worker, 0=neutral, -1=pro-employer and accumulate this over the period to generate the labor regulation measure.
Number of alcohol and manufacturing factories refers to registered factories only. The proportion of alcohol factories is a measure of the relative location of the alcohol industry across Indian states.

Table 2.10: Taxation

	Proportion Population Under Complete Prohibition					
Proportion	(1) GLS AR(1)	(2) GLS AR(1)	(3) GLS AR(1)	(4) GLS AR(1)	(5) GLS AR(1)	(6) GLS AR(1)
Tax Revenue of GDP	-0.277 (0.660)					
Non-Tax Revenue		0.079 (1.040)				
State Sales Tax			-2.400 (1.431)			
State Excise				-1.931 (5.672)		
Central Grants					0.108 (1.225)	
Central Excise Share						0.887 (2.095)
Urban Population	-2.149 (2.347)	-2.404 (2.882)	-2.492 (2.873)	-1.653 (2.072)	-2.350 (2.760)	-2.225 (2.416)
Constant	0.886 (2.762)	0.925 (3.250)	1.309 (3.385)	0.893 (3.421)	0.934 (3.241)	0.859 (3.345)
Party Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	636	671	654	671	671	655

Notes: Absolute value of z statistics in parentheses. All models include state and year effects. All right hand-side variables lagged one year. Party controls include share of seats by party groups as in Column 2 Table 2.5. All proportions except proportion tax revenue to GDP are to total state revenues.

Table 2.11: Mimicry

	Proportion Population Under Complete Prohibition			
	(1)	(2)	(3)	(4)
Proportion	GLS AR(1)	GLS AR(1)	GLS (IV)	GLS (IV)
States with Prohibition	-2.986	-3.070	-2.975	-3.223
	(9.251)	(9.482)	(8.843)	(9.339)
Alcohol Factories			-1.097	-1.619
			(4.618)	(4.856)
Alcohol Factories* States with Prohibition				1.136
				(2.267)
Urban Population	-1.740	-2.095	-1.699	-1.464
	(3.020)	(3.336)	(2.506)	(2.154)
Constant	0.794	0.828	0.869	0.855
	(4.871)	(3.695)	(4.793)	(4.751)
Party Controls	No	Yes	No	Yes
Observations	676	672	628	628

Notes: Absolute value of z statistics in parentheses. All models include state and year effects. All right hand-side variables lagged one year. Party controls include share of seats by party groups as in Column 2 Table 2.5.

Table 2.12: Death Rates

	Proportion Population Under Complete Prohibition					
	(1) GLS AR(1)	(2) GLS AR(1)	(3) GLS AR(1)	(4) GLS AR(1)	(5) GLS AR(1)	(6) GLS AR(1)
Log Treated Liver Diseases	0.004					
	(0.634)					
Log Liver Disease Deaths		-0.001				
		(0.148)				
Log Liver Cirrhosis Deaths			-0.001			
			(0.013)			
Log Spurious Liquor Deaths				-0.001		
				(0.274)		
Log Poisoning Deaths					-0.001	
					(0.138)	
Log Road Accident Deaths						0.004
						(0.478)
Proportion Urban Population	-8.666	-8.546	-0.004	0.084	0.170	0.150
	(2.480)	(2.441)	(0.011)	(0.144)	(0.349)	(0.314)
Constant	2.188	2.201	0.002	0.152	0.071	0.008
	(2.597)	(2.611)	(0.016)	(0.579)	(0.479)	(0.044)
Observations	326	326	192	237	480	480

Notes: Absolute value of z statistics in parentheses. All models include state and year effects. All right hand-side variables lagged one year. Party controls include share of seats by party groups as in Column 2 Table 2.5.

Table 2.13: Crime Rates

	Proportion Population Under Complete Prohibition					
	(1)	(2)	(3)	(4)	(5)	(6)
Proportion	GLS AR(1)	GLS AR(1)	GLS AR(1)	GLS AR(1)	GLS AR(1)	GLS AR(1)
Rapes	0.113					
	(0.091)					
Murders		0.111				
		(0.265)				
Thefts			0.069			
			(0.363)			
Burglaries				-0.148		
				(1.328)		
Robberies					-0.109	
					(0.262)	
Dacoity						1.731
						(1.141)
Proportion	0.071	-2.136	-2.152	-2.076	-2.203	-2.170
Urban Population	(0.145)	(2.306)	(2.365)	(2.296)	(2.443)	(2.389)
Constant	0.103	0.755	0.753	0.747	0.776	0.765
	(0.387)	(2.691)	(2.713)	(2.747)	(2.859)	(2.790)
Observations	288	675	675	675	675	675

Notes: Absolute value of z statistics in parentheses. All models include state and year effects. All right hand-side variables lagged one year. Party controls include share of seats by party groups as in Column 2 Table 2.5.

Table 2.14: State Finance Interactions

	Proportion Population Under Complete Prohibition							
Proportion	GLS AR(1) (1)	GLS AR(1) (2)	GLS AR(1) (3)	GLS AR(1) (4)	GLS AR(1) (5)	GLS AR(1) (6)	GLS AR(1) (7)	GLS AR(1) (8)
Alcohol Factories	-1.045	-0.112	-0.862	-1.674				
	(4.035)	(0.201)	(3.272)	(3.324)				
State Excise	-1.916	-1.355			-2.069	-1.535		
	(5.348)	(2.951)			(6.120)	(4.250)		
Alcohol Factories*		-13.975						
State Excise		(1.919)						
Central Excise Share			1.077	0.374			0.747	0.427
			(2.361)	(0.650)			(1.581)	(0.857)
Alcohol Factories*				6.906				
Central Excise Share				(1.893)				
States with Prohibition					-3.069	-2.932	-2.999	-3.404
					(9.455)	(9.013)	(8.889)	(9.438)
State Excise*						-2.550		
States with Prohibition						(3.456)		
Central Excise*								0.868
States with Prohibition								(1.786)
Urban Population	-1.346	-1.423	-1.978	-1.922	-0.982	-1.161	-2.018	-2.161
	(1.445)	(1.542)	(1.952)	(1.908)	(1.650)	(2.006)	(3.003)	(3.238)
Constant	1.038	1.032	0.889	0.944	0.673	0.664	3.298	3.643
	(4.448)	(4.472)	(3.326)	(3.544)	(3.307)	(3.337)	(8.546)	(9.144)
Observations	623	623	623	623	671	671	655	655
Party Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Absolute value of z statistics in parentheses. All models include state and year effects. All right hand-side variables lagged one year. Party controls include share of seats by party groups as in Column 2 Table 2.5.

Table 2.15: Alcohol Industry Interactions

	Proportion Population Under Complete Prohibition					
	GLS (IV) (1)	GLS (AR1) (2)	GLS (IV) (3)	GLS (AR1) (4)	GLS (AR1) (5)	GLS (AR1) (6)
No. Alcohol Factories	-0.005	-0.041	-0.008	-0.008	-0.002	-0.010
	(1.740)	(2.737)	(4.029)	(4.267)	(1.907)	(2.893)
Proportion Female Seats	-22.210	-23.587				
	(2.224)	(2.563)				
No. Alcohol Factory* Prop Female Seats		0.869				
		(2.304)				
Election Year Dummy			0.334	0.248		
			(6.234)	(6.770)		
No/ Alcohol Factory *Election Year				0.003		
				(2.985)		
Proportion SC Seats					2.726	2.195
					(3.070)	(2.417)
Prop Alcohol Factory* Prop SC Seats						0.051
						(2.423)
Proportion Urban Population	-1.345	-1.447	-2.293	-2.263	-1.734	-1.189
	(0.592)	(0.737)	(1.156)	(1.158)	(1.701)	(1.159)
Constant	0.022	0.584	0.427	0.426	0.515	0.520
	(0.031)	(0.887)	(1.048)	(1.069)	(1.772)	(1.808)
Observations	580	580	624	624	622	622
R-squared			0.545	0.581		
Party Controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Absolute value of z statistics in parentheses. All models include state and year effects. Instrument used for column 1 is female literacy rate. Instrument used for column (3) as described in text and footnote to Table 2.4. Columns 2 and 4 were not instrumented as additional instruments were not available. All variables lagged one year except female and SC politicians which are lagged one election. Party controls include share of seats by party groups as in Column 2 Table 2.5.

Chapter 3

Alcohol Prohibition and Addictive Consumption

"Prohibition is better than no liquor at all."

Will Rogers, (1879-1935) American Humorist and Actor.

3.1 Introduction

Finding tools to affect alcohol consumption is key to reducing the international increase in alcohol-related diseases. Alcohol-related illnesses are now represented in the top ten causes of deaths worldwide, with the fastest growth observed in the developing countries of the Asian sub-continent. This trend has been underlined by a 50% increase in per capita *pure* alcohol consumption since 1980 (WHO (2002)). For developing nations as a whole, such consumption directs resources away from basic necessities such as food and shelter and may have acute consequences for the welfare of other individuals living within these households. It also creates a double burden on limited health resources focused on fighting undernutrition and communicable diseases. Mortality represents one aspect of the numerous negative private and social effects of excessive alcohol consumption – the medical literature has also emphasized the increased risk of liver cirrhosis, kidney failure and mental illness[1].

[1] Although some medical research suggests that moderate alcohol consumption is beneficial as it reduces the probability of coronary heart disease, strokes and diabetes mellitus, the consensus is that these positive

There is also strong empirical evidence to suggest that alcohol consumption is associated with negative externalities such as domestic violence, crime, and a higher incidence of motor vehicle accidents[2].

The element of individual decision-making in triggering alcohol- (and other choice-) related diseases implies a possible role for government policy[3]. Traditional policy tools to reduce alcohol consumption include measures to affect price directly such as taxation; or legal enactments to prevent consumption such as prohibition, which have a more indirect effect on the implicit price. The most common methods have been taxation, minimum age requirements, and restrictions on drinking hours. However, taxation may have a limited impact on price when demand is inelastic and may not be implemented effectively in economies with under-developed taxation systems and poor institutional environments. It is therefore, important to analyse the impact of alternative policy handles which may be more feasible to implement and more effective in reducing alcohol consumption in developing country settings.

This paper examines the determinants of alcohol consumption in India and assesses the impact of state-level alcohol prohibition on alcohol demand. Prohibition is an under-researched policy area and relatively little is known about its effects on alcohol consumption in both developed and developing countries. In fact, it is not clear a priori, whether prohibition affects consumption and, if so, in which direction and through which mechanisms. Studying the effectiveness of prohibition is also important given the finding from Chapter 2 that governments enact prohibition to fulfil alternative self-motivated objectives as opposed to improving the efficiency of the market. Consequently, whether prohibition has any impact, and if so of what kind, is imperative in assessing the inherent associated trade-offs. Finally, examining prohibition policy is important in its own right as it encompasses a sig-

health benefits are overshadowed by the negative effects of excessive alcohol consumption (WHO, 2001).

[2]The WHO (2001) estimates that alcohol causes approximately 20-30 % of motor vehicle accidents, homicide, and other intentional injuries. For econometric research linking alcohol to the related externalities see for example, Ruhm (1996); Markowitz & Grossman (1998; 1999); Markowitz (1999; 2000a; 2000b); Miron (1999a).

[3]As noted in Chapter 2, paternalism is economically valid if there are consumption externalities or if there is bounded rationality or self-control problems. Nevertheless, arguments for paternalism are not sufficient conditions for prohibition. Rather they imply that there may be a role for government in reducing consumption but does not specify the actual mechanism.

nificant policy tool for alcohol control in India - most states at some point have introduced alcohol prohibition legislation. This allows for substantial variation in policy across states and over time, ideal for assessing the effects of prohibition policy.

Alcohol prohibition is modelled as increasing both the fixed costs of consumption and the consumer price in a static model of household demand. The empirical effect on alcohol participation and the magnitude of demand is estimated using a Heckman selection model of alcohol quantity and budget shares controlling for a large set of household characteristics. The effects on the supply side and, in particular, producer prices are inferred through a careful analysis of the effect of prohibition on alcohol unit values. Robustness of the results from these two analysis are checked by decomposing the effect of total alcohol by type and examining the cross-demand effects between alcohol groups. The analysis finds that the effect of prohibition on alcohol demand differs by the type of policy enacted and the alcohol group. Overall, the estimates suggest that complete prohibition decreased alcohol participation by 26%. This resulted mainly from the deterrent effect of prohibition on demand although supply shifts also occurred. During periods when only one type of alcohol is prohibited, supply shifts are the dominant mechanism in reducing alcohol participation. While total alcohol participation decreased, prohibition increased consumption for certain types of liquor. Specifically, complete prohibition increased demand for toddy which is traditionally home brewed, while partial prohibition increased demand for non-prohibited close substitutes.

The significant variation afforded by Indian state prohibition policy provides a useful instrument to examine the relationship between alcohol and other "bads" such as leaf tobacco, cigarettes, bidis, and pan. The nature of this relationship is important to assess the magnitude and nature of spill-over effects of alcohol policy, and provide some insight on how consumption of these *addictive goods*[4] can also be curtailed. The results show that alcohol and tobacco, and alcohol and pan are complements, although the relationship varies be-

[4]Addictive goods are defined as goods for ehich past consumption has a positive impact on present consumption. In Becker and Murphy's (1988) rational addiction model, future consumption also affects current consumption levels. Addictive goods are modelled to have two characteristics: reinforcement, in that past consumption increases the marginal utility of current consumption; and tolerance, in that higher current consumption is required to attain the same level of utility as in the past (Gruber and Koszegi (2001); Becker and Murphy (1990)).

tween disaggregated tobacco and alcohol items. The spillover effects of alcohol prohibition therefore worked to decrease overall consumption of these goods.

This paper adds to the significant economic literature on alcohol demand and the impact of policy in curtailing demand. The study of alcohol prohibition improves our understanding of alternative policy handles, while the developing country focus expands the empirical literature beyond economies with well-functioning markets and institutions. The main contribution of this paper is a systematic analysis of three types of prohibition policy using household reported data on alcohol consumption which mitigates data problems faced by other studies. The paper also adds to the body of work assessing the relationship between groups of bads. Specifically, it identifies the relationship between alcohol, tobacco, and pan. In doing so it offers insight into the spillover effects of alcohol policies on these markets.

The remainder of the chapter is organized as follows. The next section motivates the research and discusses background issues. Section 3 describes the data and summary statistics of the main variables. The basic model and empirical specification are laid out in Sections 4 and 5. The main results are reported in Section 6. Section 7 carries out unit value analysis to estimate the price-effect of prohibition. Section 8 discusses the mechanism through which prohibition policy effects alcohol consumption. The relationship between alcohol and tobacco and pan items is examined in Section 9 and Section 10 concludes.

3.2 Background

There is extensive literature on the effect of alcohol policy on alcohol demand in developed countries. Key to this analysis is the price elasticity of demand as this indicates whether consumption can be affected by "price-effecting" policies like taxation, and if so to what extent. These studies find that the own-price effect for alcohol[5] is negative and varies substantially across type of drink, and socioeconomic and demographic groups[6]. Research

[5] Clements et al (1997) report that for Australia, Canada, Finland, New Zealand, Norway, Sweden, and the U.K. as a whole, the own-price effect for alcohol ranges from -0.98 for spirits to -0.35 for beer and -0.68 for wine. Leung and Phelps (1993) report elasticities for the US of -0.2 to -1.0 for beer, -0.3 to -1.8 for wine, and -0.5 to -3.0 for spirits. See Cook and Moore (1999) for a survey of the literature.

[6] Research based on US data suggests that alcohol consumption patterns also vary by gender, age and race with women and youths having more elastic, and ethnic minorities having less elastic, alcohol demands relative to white adult males. See Grossman et al, (1987; 1993; 1994); Coate and Grossman (1988); Cook

on similar empirical issues in the developing world is more limited. While it can be argued that the underlying models of addictive consumption can be equally applied to all countries, it is harder to assume, for reasons of culture, climate and religion, that own-and cross-price elasticities for these goods will be similar in magnitude and sign with those found for the developed world. Consequently, little is known about the effectiveness and impact of traditional alcohol controls policies in developing countries.

This chapter focuses on a relatively under-researched policy tool (in both developed and developing countries), used for curtailing the pattern and magnitude of alcohol consumption - prohibition. Given the limited econometric analysis of prohibition, analysing its impact on the consumption of alcohol and its substitutes is important, particularly as the direction and magnitude of its effect is unclear a priori. For example, on the demand side, while the illegal nature of consumption may reduce demand, prohibition may lead to "glamorization" of alcohol[7] and hence increase consumption amongst certain groups. The effects on the supply side and prices is also unclear, as prohibition may not necessarily result in an increase in costs. This is likely to occur when there are high initial state excise rates on production that are abolished during prohibition periods[8]. The mechanism through which prohibition works is not clearly understood. If supply factors are driving the change, alternatives should focus on policies to increase the production cost of alcohol. On the other hand, if demand factors dominate then policies should emphasize increasing the cost of consumption, for example, through permits. There is also limited understanding of other unintended effects of prohibition policy such as the demand effect on addictive goods which are substitutes for alcohol such as tobacco or drugs, or the impact on illegal activities and criminal violence. Therefore, studying alcohol prohibition may shed light on the policy effectiveness of prohibition of other addictive goods such as opium, bhang and cocaine and the potential policy problems which may ensue.

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and Moore (1993); Kenkel (1993); Saffer and Chaloupka (1998).

[7]It is hypothesized that this was a factor in increasing alcohol demand in the 1930s prohibition of alcohol in the US. It is also believed that drug prohibition increases drug consumption in some countries for the same reason Thornton (1991).

[8]Miron (2001) formulates a model of supply under prohibition and denotes that although the price of the good under prohibition may fall below the non-prohibition price if the tax rate is high, this is not an equilibrium for firms to comply with the tax under non-prohibition. The price under prohibition must therefore always exceed (weakly) the price under taxation, although the differential may be arbitrarily small.

While the efficacy of prohibition versus other policy handles such as taxation is an important area of research, it is beyond the scope of this paper. This is mainly due to the problems of finding a precise price or tax for alcohol comparable across states[9]. In contrast, prohibition legislation is more or less consistent in its mandate across states[10] and over time, and a relatively easier variable to collect. However we can infer that if prohibition is found to increase alcohol supply or have little effect on alcohol consumption, aside from driving it underground, other policy levers, such as higher taxation or production quotas, should be emphasized to curtail consumption. The effect on consumption is particularly important from a public health perspective since available liquor during prohibition is usually illicitly produced (and also illegally transported from other states) and hence may have serious health consequences for consumers. If the health side-effects are sufficiently large, taxation may be a superior tool to curtail alcohol consumption as it allows regulation of quality as well as providing the government with an important (in terms of size) source of revenue.

On the other hand, if alcohol demand is price inelastic (at the mean or for segments of the demand function) it may not be affected by taxation, thus requiring alternate control methods such as prohibition. The existing literature for India finds mixed results for the elasticity of alcohol demand. Musgrave and Stern (1988) find demand to be price inelastic with elasticities in the range of -0.47 and -0.62. This is corroborated by Reddy and Patnaik (1993) and NCAER (2001) who find that higher prices do not decrease demand but lead to increased consumption of cheaper varieties of liquor. On the other hand, Mahal (2000) finds

[9]This is difficult because the price of a "drink" depends on the type of beverage, brand, volume, retailer and location of consumption (restaurants, bars or residence), and can vary across localities. In the absence of a local-area price index researchers focusing on developed countries have typically used the average price of a 6-pack of beer or the state excise rate on beer (Cook and Moore (1999)). A similar analysis is problematic for Indian states as state-specific alcohol prices are not publicly released, are collected mainly from urban centers, and as such are not representative of rural prices. Furthermore, even if such prices were available it would be difficult to construct an average price for a representative beverage, as there is substantial product heterogeneity even within the narrowly defined and commonly consumed local liquor, arrack. The alternative of using state excise rates is also problematic due to the complex and disparate excise systems in place which make it difficult to calculate effective tax rates across states and even across time within the same state. To highlight this further, note that duties range from flat-rate fees to percentages of the manufactured cost, actual retail price, or estimated market price set by the state government. These in turn can be levied per bulk liter, proof, bottle or case. Aside from these there are different state-imposed production and retail structures, some of which are designed to curtail consumption and hence have different effects on the market price of alcohol.

[10]In fact, prohibition legislation across most states is very similar in terms of its extent and the penalties it imposes on the production and consumption of prohibited liquor items.

demand to be elastic for specific segments of the function and for particular demographic groups. In particular, Mahal finds the elasticity of alcohol participation to range from -0.50 for individuals aged 25 years and over to -1.0 for those between 15 and 25 years[11]. While these elasticity estimates lie in the mid-range of figures reported in the literature for the developed countries, prohibition may be more effective relative to taxation in affecting demand for alcohol in India. Furthermore, as noted in Chapter 2, prohibition may also be more efficient in settings with under-developed tax systems or where tax evasion is high.

Existing econometric analysis of prohibition for the US and other developed countries suffer from serious data limitations as consumption is usually inferred from sales/production data or estimated using proxies for consumption. The former is subject to large measurement errors as, during prohibition periods, limited records are kept for potable alcohol production and no correction is made for illegal supply[12]. Using proxies such as the liver cirrhosis rate or incidence of alcoholism to infer the effect of prohibition on consumption is also problematic due to the long gestation period of the effect of alcohol consumption on health[13]. Empirical research on prohibition in India is limited to Mahal (2000) who examined alcohol policy in a group of Indian states and included a prohibition dummy for Gujarat in his analysis. He found that prohibition has large negative effects on alcohol consumption and simulated declines in consumption rates of 30% to 67% for those over 25 years of age and of 90% for those aged between 15 to 25 years. The main problem with Mahal's analysis of prohibition is that the prohibition variable is, in effect, a dummy for Gujarat. As such, its effects on alcohol consumption are indistinguishable from fixed-effects particular to Gujarat for example, a lower disposition for consuming alcohol due to differences in preferences, culture or history

There is therefore a significant gap in the literature on alcohol policy, and addictive goods as a whole, on the effects of alcohol prohibition. The main contribution of this pa-

[11] Musgrave and Stern (1988) estimate arrack price elasticities using household expenditure surveys for Karnataka in 1973/74 and 1977/78. Mahal (2000), calculates the price elasticity of participation using a specialized drug survey for Andhra Pradesh. While Deaton (1997) uses NSS alcohol budget-shares in the adult-goods approach to detect gender discrimination, the analysis does not cover the price determinants of alcohol demand. Aside from these studies, there has been practically no microeconometric work on estimating the effect of policy on alcohol demand, and its cross-price effects, in India.

[12] See, for example, Bentzen et al (1999).

[13] See Miron and Zwiebel (1991); Miron (1999b); Dills and Miron (2001).

per to the existing research is that it provides a systematic analysis of the effect of three types of prohibition policy on the consumption of alcohol by alcohol type. It also mitigates some of the data problems in previous studies by using a series of representative consumer expenditure surveys which cover both home-produced and purchased alcohol. Use of micro-data allows examination of detailed household characteristics on demand and provides the necessary degrees of freedom to estimate a large number of parameters consistently. The analysis in this paper also adds to the understanding of the nature of demand functions for alcohol, tobacco, and pan in developing country settings. In doing so it identifies the relationship between alcohol and other "bads" by using prohibition as an instrument for price. This improves our understanding of the potential spillover effects of alcohol policy on the consumption of these items.

3.3 Data and Main Variables

3.3.1 Dataset

The main data used in the paper is comprised of measures of prohibition and estimates of alcohol consumption. As per Chapter 2, prohibition policy is compiled from State Local Acts (See Chapter 2, Appendix 1) and therefore the variable captures enacted legislation and not actual enforcement. While the scope of legislation is similar across states and time, there are small variations in the extent of penalties imposed[14]. Therefore, *effective* prohibition can vary over time, across and within states, particularly between rural and urban areas. Over the sample period studied, prohibition within a state was enacted over the whole state area[15] as opposed to in the 1960s and 1970s when it was common to have prohibition in selected districts. This implies a natural measure of prohibition as a dummy variable such that it takes the value of one for states enacting prohibition for the years of the policy and zero otherwise. In all instances prohibition covers both consumption

[14]Legislation tends to focus mainly on producers although there are penalties for consumers for consuming alcohol during prohibition. The terms of sentences in penalties are fairly similar although there is some variation in the level of penalties levied. For example, in Kerala the penalty on alcohol producers is Rs5000 whereas in Andhra Pradesh it is Rs1000. On the other hand, the penalties for consumers tend to be similar across states.

[15]The only exception over 1983-2000 is Uttar Pradesh which had prohibition in selected areas over 1983-1991. This covered 12% of the state's population.

and production of the alcohol. Three types of prohibition policy are examined: periods of *complete prohibition* of all alcohol items; periods of *partial prohibition* when only arrack[16] and no other alcohol is prohibited; and periods of *arrack prohibition* which measures all years of arrack prohibition including when there is complete prohibition. The summary statistics in Table 3.1 show that complete prohibition occurred in 8% of the sample, arrack prohibition 19%, and partial prohibition 11% reflecting the relative popularity of arrack and partial prohibition over the period.

The consumption dataset is compiled from 13 rounds[17] of the National Sample Survey of India (NSS) covering the years 1983-2000. The NSS is an All-India representative, household consumption-expenditure survey covering over 500 food and non-food items and contains a large set of household characteristics. The sample studied is a series of cross-sections of approximately 600,000 households in both rural and urban sectors of the 16 major states[18] with strictly positive total household expenditure[19]. The large sample size, time period and wide set of socioeconomic variables allow for substantial variation across time and states, making it ideal for the study of the impact of alcohol policy on household behaviour.

Total household expenditure and quantity purchased is assumed to be synonymous with consumption and includes cash purchase and home grown consumption in the last 30-days. Consumption items examined are alcohol disaggregated by type of liquor, tobacco items, and pan. Alcohol comprises *country liquor* or *arrack* - an unrefined distilled spirit, generally made from locally available (and cheap) raw materials such as sugarcane, rice, and coconuts; *Indian Made Foreign Liquor (IMFL)* - alcohol items such as whisky, gin and rum, formally produced in large distilleries; beer which includes any alcoholic drink fermented from grain; and toddy - fermented palm liquor generally home-brewed.

Several measures of consumption are examined: the budget share of alcohol in total

[16]There are some incidences when only toddy was prohibited but these tend to coincide with arrack prohibition. As these periods are relatively few they were not analyzed separately.

[17]These are the 38th, 43rd, 45th, 46th, 47th, 48th, 49th, 50th, 51st, 52nd, 53rd, 54th and 55th rounds respectively.

[18]These are Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal. Together they account for over 95% of total population. In my preliminary analysis of the data I included all states and found no change in my main results when the smaller states are dropped.

[19]Households reporting per capita expenditures (on all items) lying in the bottom and top 0.05 percentile of the distribution were excluded to ensure that results were not excessively influenced by outliers.

household monthly expenditure, total quantity consumed, and participation in alcohol as estimated by the Heckman model. These measures were selected as they capture differential effects of prohibition on the pattern of alcohol consumption[20]. Reported participation treats all households who consume liquor equally regardless of the level of consumption, whereas budget share analysis and quantity consumed assess the magnitude of consumption once the participation constraint has been fulfilled[21]. Between the latter measures, quantity may be a better indicator of the level of consumption if the associated error in recalling quantity consumed does not change across prohibition and non-prohibition periods. However, quantity variables may be more subject to measurement error, particular in the case of liquor, where prices are usually by the glass or bottle. While, price changes during prohibition (say if illegal liquor is more expensive or harder to acquire) cannot be controlled for using budget shares, the nature of data collection in the National Sample Survey, and the truncation arising from using budget shares suggests that the expenditure data may be more reliable and less susceptible to outliers. I therefore report budget share estimates and refer to the quantity consumed estimates as a further robustness check. In all of the above discussion it should be noted that I assume that the underlying liquor in terms of strength and proof, remains the same during prohibition.

3.3.2 Measuring Alcohol Consumption

Most papers examining alcohol consumption patterns proxy per capita consumption by adjusting production or sales data for the population above 15 years. There are several problems with using such a variable in assessing the impact of prohibition on consumption. The primary problem is that during periods of prohibition, production data or retail sales of potable alcohol are not officially collected[22]. Hence it is impossible to accurately assess the

[20] Although the NSS disaggregates consumption into home-grown and cash purchase, an analysis of the extent of home-produced alcohol was not possible due to the limited sample size and small budget share.

[21] However, both budget shares and quantity consumed are limited measures of actual alcohol consumption as they do not account for the strength, or proof, of drink consumed.

[22] In general, in India, figures on retail sales of alcohol are not available as the state government does not collect these statistics. The main source of estimates of retail sales is from national breweries such as UB Breweries who are extremely reluctant to provide these figures and tend not to maintain historical series. Production data is available only through surveys such as the Annual Survey of Industries conducted by the Central Statistical Organization which do not distinguish between domestic and foreign consumption.

amount of alcohol available in practise even using the simple calculation described above. The second issue is that of illicit production which generally exists but expands rapidly during prohibition[23]. Using production data would not capture this segment of the market and hence would result in an underestimation of alcohol consumption. It would also fail to shed light on an important side effect of prohibition - the extent of the consumption of illicit alcohol and the increased probability of consuming spurious liquor detrimental to consumer health. A separate issue, which is related to the measurement error in calculating per capita consumption using production or sales data, is that production figures do not take into account inventories or stockpiling at the manufacturing or retailing level which would lead to an overestimate of actual consumption levels.

In the Indian context, state alcohol production data are not reliable measures of state consumption as production is concentrated in a small number of states and not highly correlated with consumption. In addition, there are significant cross-border movement of goods. Given that records of cross-border movement of alcohol are limited, no adjustment can be made to state production figures implying that production figures alone are not an accurate estimate of in-state consumption. Finally, production data does not allow inference on the socioeconomic characteristics of alcohol consumers and the frequency with which they consume. Both these issues are extremely relevant when assessing and estimating the response to any policy change.

The main disadvantage of using the consumer expenditure surveys to estimate consumption is that the data is at the household level and so who consumes cannot be directly assessed. However, specialized surveys of drug dependency are generally small scale, cross-sectional and localized in their geographical area of coverage. As such, they are not suited to study the effects of alcohol policy across states and over time[24]. A second disadvantage is the lack of data on the frequency of consumption, defined as the number of units consumed within a specific period of time (usually a week). This is an important indicator in assessing the negative effects of alcohol and may itself be affected by prohibition policies. For exam-

[23] The 1964 Committee on Alcohol Prohibition is one of the few studies on the extent of illegal liquor in India and provides interesting accounts of how this sector rapidly expands during prohibition.

[24] Examples include NCAER's 1994 rural household survey studying alcohol consumption, the Ministry of Social Welfare's 1979 survey of drug dependency in rural Rajasthan, and the WHO's 1997 survey of alcohol consumption in three Indian districts.

ple, if prohibition increases the fixed cost of obtaining alcohol, by increasing search costs or distance to liquor outlet, frequency of consumption may decrease due to the higher effect price of consumption. On the other hand, frequency may increase as individuals consume more in a single visit to the local arrack shop than they normally would do. This is an important spillover specific to prohibition policy which cannot be studied with the available data, but which qualitative evidence from Andhra Pradesh suggests may be significant (Kumari and Salaam (1997)).

Another pertinent issue is that reported alcohol consumption from consumer expenditure surveys tends to be sizably lower than figures obtained from retail sales and production[25] (WHO (2000). Such figures do not exist for India but the experience from other country studies suggests the shortfall may be significant and hence a relevant issue when assessing alcohol demand from expenditure surveys. The discrepancy may be due to underreporting as discussed below, or because the design of household surveys tends to exclude some heavy drinkers such as slum dwellers and migrant workers or households with transitory life-styles for example, some nomadic tribes. The first two groups are excluded as slums do not fall in the NSS sample frame and because the expenditures of transitory workers are not generally included in the expenses of their permanent household. Amongst the household population, non-response may be higher in households headed by young adults or heavy drinkers further leading to lower estimates of consumption in the aggregate sample. This is supported by studies for the UK which suggest a high degree of skewness in alcohol consumption(Kemsley et al (1980)). In particular, Redpath (1987) notes that "30% of the total consumed was accounted for by only 3% of the population".

Alcohol expenditure may also be lumpy and extend beyond the 30-day recall period. This is plausible given the context in which alcohol is consumed in India with consumption often being confined to social occasions, public holidays and festivals. The 30-day recall would overestimate consumption for households who purchase alcohol over greater than 30-day intervals but happened to purchase alcohol during the survey period, if such households were not randomly distributed across the sample frame. It would underestimate the true

[25] Cook & Moore (1999) report that comparisons of self-reported drinking with sales data suggests that such surveys typically capture only 40-60% of actual consumption.

consumption for households who did not report consumption during the survey period but consumed over a longer period of time or during specific occasions. If there is a greater proportion of the population in the latter category this would result in an underestimation of consumption at the aggregate level. In addition to this, there are also reports of alcohol being distributed free during election campaigns in rural areas. As the NSS does not collect data on consumption out of gifts for all years this may explain any actual shortfall in estimates of per capita alcohol consumption based on consumption and production data.

Given this, and the issues later discussed regarding underreporting, it is important to emphasize that the analysis below refers to reported alcohol consumption in households whose period of purchase is less than 30-days and who happened to purchase alcohol items during that time, and is not representative of all alcohol consumers in general. Furthermore, purchase or expenditure on alcohol is taken to be synonymous with consumption i.e. stockpiling at the household level and distribution to guests is ignored.

3.3.3 Summary Statistics

Table 3.1 reports summary statistics on key variables used in the analysis. Approximately 12 % of the total sample report consuming some form of alcohol. Arrack is the most widely consumed form of liquor although in the Southern States (Andhra Pradesh in particular) the quantity of toddy consumed is also high. 71% of the total sample reporting alcohol consumption in the last 30 days consumed arrack; the corresponding figure for toddy is 20% and 10% for IMFL. However the consumption of IMFL has been steadily increasing, and in some states is higher than the consumption of toddy. Beer and wine have the least coverage - only 3% of the alcohol consuming sample report beer consumption. The data suggests that the majority of households consume a particular type of liquor - only 4% of households reporting alcohol consumption consume more than one type of liquor. If this is correlated with household characteristics then the effects of partial prohibition will impact only specific groups amongst the alcohol consuming population.

Average quantity consumed per household is 10 litres per month, being 8.6 litres for arrack, 13.4 litres for toddy, 2 litres for IMFL, and 5.1 litres for beer. Figure 3.1 shows the distribution of the total alcohol budget share which has a mean of 5.1% and a median of

3.6%[26]. In line with other studies on alcohol expenditure, the distribution is skewed to the right: 5.5% have a budget share larger than 15% and 0.5% have a share greater than 30%. There does not appear to be any systematic observable difference between households with large budget-shares (i.e. greater than 15%) devoted to alcohol and the rest of the alcohol consuming sample.

Table 3.2 and Figure 3.2 show the significant variation in alcohol consumption across the 16 major states[27]. Reported consumption, the percent of households reporting alcohol consumption, ranges from 4.7% in Gujarat[28] to 20% in Andhra Pradesh; while quantity consumed ranges from 9 to 18 litres per month for the same states. However, the disparity in average alcohol budget shares is lower, with households in Gujarat reporting an average budget share of 5.2% relative to 6.0% in Andhra Pradesh. There is also a distinct sectoral split in the level and type of liquor consumed with reported and quantity of consumption being much higher in the rural sector - 14% compared to 8.3% for participation and 10.4 litres per month relative to 8.6 for quantity consumed. However, average budget shares are significantly higher in the urban sector, 5.6% relative to 4.9% in the rural sector, reflecting higher urban prices on average. While arrack is preferred throughout both areas, there is a preference for toddy in rural households and IMFL in urban centres. There is no significant difference in taste for beer across sectors.

3.4 Basic Model

I assume a static model of alcohol demand with a weakly separable utility function with respect to alcohol and other goods and services[29]. In doing so I am ignoring the addictive

[26] These figures are computed for the alcohol consuming population.

[27] Andhra Pradesh enacted partial prohibition of arrack from 1993 and complete prohibition between 1995-1997. The effect of this policy change is reflected in the figure which shows a dramatic decline in reported arrack consumption from 1993 onwards. West Bengal is one of the few states never to have had prohibition and shows a steady, slightly downwards, pattern of alcohol consumption aside from a slight increase in 1992/93 during trade liberalization when several constraints on the industry were lifted. The most important of these was lifting the constraints on grain-based alcohol production that enabled distilleries to expand their capacity for IMFL.

[28] Despite having complete prohibition since Independence, the data for Gujarat shows positive alcohol consumption. The source of this liquor is either illicit production or smuggled goods from neighboring states. There are also reports of individuals living near state borders temporarily crossing over for a few drinks.

[29] This ensures that the model is suitably identified and we can analyze the effects of changes in alcohol "price" without having to consider the effects on other goods.

and habit-formation element of alcohol consumption, mainly due to the limitations on the empirical analysis imposed by the available data[30]. Ignoring myopic or rational addiction may result in an underestimation of the price-sensitivity of alcohol consumption and hence the effectiveness of prohibition policy, both over the short-and long-term. For example, Grossman, Chaloupka and Sirtalan (1995) find that in the US the long-run elasticity of consumption with respect to price of beer is approximately 60% larger than the short run price elasticity in models of addictive behaviour, and twice as large as the elasticity that ignores addiction. Therefore the possibility that our estimates of the impact of prohibition are the lower bound should be kept in mind when interpreting the results.

The household maximizes a quasi-linear utility function subject to a budget constraint:

$$Max_{x,y}\ \theta U(x) + y \qquad s.t. \qquad px + y = M - c \tag{3.1}$$

$$U(0) = 0, \qquad U''(x) < 0, \qquad c \succeq 0 \tag{3.2}$$

where θ is a taste parameter, x is alcohol, y is a composite commodity representing all other goods, p is the price of alcohol, M is household income, and c is a fixed cost of consuming alcohol. First-order conditions are:

$$\theta U' - \lambda p = 0 \tag{3.3}$$

$$1 - \lambda = 0 \tag{3.4}$$

$$px + y\ - M + c = 0 \tag{3.5}$$

[30] One potential solution is to study the effects of prohibition announcements as an indicator of future price. The problem with this approach is that information about such announcements is difficult to collect and household-level stockpiling makes it difficult to detect the direct effect on present consumption due to the anticipated decrease in future consumption.

These imply:

$$\theta U'(x) = \lambda p = p/\theta \tag{3.6}$$

$$x = U'^{-1}(p/\theta) = x(p/\theta) \tag{3.7}$$

$$y = M - c - px(p/\theta) \tag{3.8}$$

The indirect utility function is:

$$V(\theta, p, c) = \theta U(x(p/\theta)) + M - c - px(p/\theta) \tag{3.9}$$

so the household will consume if:

$$V(\theta, p) = \theta U(x(p/\theta)) + M - px(p/\theta) \succeq c \tag{3.10}$$

$$V(\theta^*, p) = c \tag{3.11}$$

Demand for alcohol is then:

$$x = \begin{cases} x(p/\theta) & \text{if } \theta \succeq \theta^*(c,p) \\ 0 & \text{otherwise} \end{cases} \tag{3.12}$$

Within this model, a pure shift in c has a direct effect on θ^* such that higher fixed costs induce households to cease consumption but do not effect demand given participation. A rise in price has two effects - a fall in $x(p/\theta)$ and a rise in $\theta^*(c,p)$.

The effect of prohibition on consumption can be analysed using this framework if we assume that prohibition increases the effective fixed cost of alcohol consumption and affects the price faced by the household. Prohibition may increase the fixed cost of alcohol for the household due to difficulties associated in acquiring liquor such as a greater distance to the local liquor source or costs of acquiring information about the supply of alcohol. In addition, in most states, purchase and consumption of liquor during prohibition is subject

to penalties further increasing the implicit fixed cost of consuming. Coupled with these are imputed costs that arise from a higher probability of drinking spurious liquor which has severe health and mental side effects (Manor (1993)). Together these factors suggest that prohibition should increase the fixed cost of participating in alcohol consumption and hence induce households at the margin to drop out of the market.

The effect of prohibition on price is ambiguous. The retail price of alcohol may rise due to the higher costs of evading detection, smuggling liquor from neighbouring states and the increased difficulty in acquiring raw materials and equipment for alcohol production. There are also severe penalties for being caught producing or retailing illicit liquor within the state (which are generally much higher than for consumption) which would factor into the production costs for illicit retailers. This rise in costs is expected to shift supply upwards, resulting in an increase in the retail price. This should reduce alcohol participation via the effects on the taste parameter and decrease the level of demand given participation.

On the other hand, prices may fall as illicit producers no longer pay state excise and other duties on production whose marginal rates are often very high. In addition, producers no longer face costs of regulation of production and may substitute towards cheaper raw materials all of which would reduce costs and increase supply. The decrease in the retail price should therefore increase participation and the level of alcohol demanded.

3.5 Empirical Specification

3.5.1 Observed Alcohol Demand

The observed demand for alcohol therefore depends on the probability of participation as follows:

$$\Pr(\theta \succeq \theta^*) = \Pr(x \succeq 0|Z, P) \tag{3.13}$$

where Z is a vector of household characteristics and P is prohibition policy. The observed demand will be equal to the true household taste for alcohol only when the first-order conditions hold with equality. In all other cases the observed demand will be zero. However, for commodities such as alcohol which are characterized as "sin goods", there are problems of underreporting in micro-surveys and hence not all zeros in a sample represent corner

solutions. In household surveys zero reports may also arise due to interviewer error and infrequency of purchase over the period of the survey.

Underreporting may arise if households wish to conceal the true expenditure on sin goods from the interviewer or other household members who are present. This is particularly relevant in the Indian sub-continent where there is a culture of abstinence across religious and social lines. For example, in the Hindu religion, alcohol consumption is seen as an impurity with the higher castes, Brahmins, being encouraged to abstain. Muslims also tend to abstain from alcohol. Underreporting may also arise due to the sex-specificity of alcohol consumption[31] - the majority of consumers are males who are often reported to spend significant percentages of their daily wages on liquor (Pathak (1985); Reddy and Patnaik (1993)). The respondent, if male, may thus want to underestimate the magnitude of their habit or that of other male household members; or if female, the respondent may not actually know the true expenditure on alcohol items.

There are two forms this understatement may take: reporting total or part of the expenditure on alcohol items under other heads such as rice or fruit; or completely omitting the item from expenditure leading to a shortfall in total expenditure. Studies in the UK on these issues have found that detection of the former is extremely difficult (Kemsley et al (1980)). Research on the latter examine shortfalls in total expenditure in the UK using special surveys in which informants had to balance all outgoings against incomings over a 14-day period. These conclude that underreporting did not generally take this form. To the author's knowledge there are no equivalent studies for the NSS or other household expenditure surveys in India. The effect of underreporting, if systematically related to prohibition, is discussed further below.

3.5.2 Estimation of Censored Dependent Variables

The implications of this and the other sources of measurement error is that alcohol demand is a zero-censored variable. Furthermore, due to underreporting and also because of the nature of the good, alcohol budget shares are typically a small proportion of the total household budget. Consequently, there may not be sufficient variation to detect any significant changes

[31] Consumption of other drugs such as tobacco and bhang is less sex-specific (AIIMS (1978)).

in consumption due to prohibition policy[32]. The standard approach to estimate censored dependent variables is the Tobit model which uses a censored maximum-likelihood function and overcomes the inconsistency of OLS. However, within the Tobit framework all zero observations represent corner solutions and hence the parametrization restricts the same set of variables and parameters to determine both the discrete probability of a nonzero outcome and the level of positive expenditures (Yen and Jensen (1996)).

The approach taken in this paper is to estimate Heckman's generalized Tobit or sample selection model which takes the following form:

$$y_{it} = \begin{cases} \mathbf{w}_{it}\beta + u_{it}\ , & \text{if } \mathbf{z}_{it}\alpha + \epsilon_{it} > 0 \text{ and } \mathbf{w}_{it}\beta + u_{it} > 0 \\ 0\ , & \text{otherwise} \end{cases} \tag{3.14}$$

where $\mathbf{w}_{it}$ and $\mathbf{z}_{it}$ are vectors of explanatory variables, α and β are vectors of parameters, and u_{it} and ϵ_{it} are error terms with $u_{it} \tilde{} N(0,\sigma)$, $\epsilon_{it} \tilde{} N(0,1)$ and $corr(u_{it},\epsilon_{it}) = \rho$. The model decomposes the observed unconditional demand for alcohol into two components, one which predicts the probability of consuming positive amounts and one which estimates the magnitude of consumption conditional on consuming alcohol. In effect the household has to overcome two hurdles for positive demand to be observed - to participate and then to consume positive amounts.

The Heckman model assumes that the participation decision dominates the consumption decision and hence zero consumption should not be thought of in terms of marginal adjustments, implied by a standard corner solution, but as a separate discrete choice. This is essentially an empirical assumption, which is based on the intuition of the underlying behavioural model and on observation of the pattern of actual consumption levels recorded in the survey. In effect, dominance implies that no individual is observed at a standard corner solution, and that once the first hurdle has been passed standard Tobit censoring is no longer relevant. This has the important implication that, unlike the standard double-hurdle model (Cragg (1971)), individuals observed with zero consumption provide no restrictions on the parameters of the Engel curve, as none of the zeros are generated by the consumption

[32]This problem is referred to in Deaton (1997) who asserts that the problem of small budget shares may be one reason the adult-goods approach to detecting gender discrimination has not been successful.

decision[33].

3.5.3 Estimation Problems

There are two main problems in estimating the Heckman model for alcohol demand. Firstly, the dependent variable (measured by the budget share and quantity) is skewed to the right as illustrated in Figure 3.1. While this may also arise from the distribution of the explanatory variables it strongly suggests that the error distribution may be non-normal. There is also the problem of heteroskedasticity which is usually present in cross-sectional data and which preliminary analysis of the data suggests is present. Since maximum likelihood estimators are scale (variance) and location (mean) dependent heteroskedasticity implies that one cannot recover the parameters of the underlying data generating process[34]. The estimates therefore lose their efficiency and consistency and may be no better than OLS estimates that ignore the censoring (Deaton (1997); Melenberg and Van Soect (1996); DiNardo and Johnston (1997)). The degree of inconsistency is generally a function of the number of censored observations - the more the censoring, the more severe the inconsistency. This is therefore likely to be a problem when estimating alcohol demand where the level of censoring is high, particularly for the lesser consumed alcohol types like beer. The problem of inconsistency is further compounded when the assumption of normal errors is violated (Arabmazar and Schmidt (1982)).

Non-normal errors can be handled by specifying an alternative distribution for the error term as in Atkinson et al (1989)[35]; using estimation strategies that require only weak assumptions about the distribution of the error term such as Powell's (1984) Censored Least Absolute Deviation (CLAD) estimator[36]; or transforming the dependent variable using the log, Box-Cox, or Inverse Hyperbolic Sine transformations (Yen and Jensen (1996)) which

[33] Note that if independence and dominance are assumed to hold together the Heckman model reduces to a probit for participation and ordinary least squares for the consumption equation, also referred to as the two-part model (Manning et al, 1987).

[34] This result was first noted by Hurd (1979), Nelson (1981) and Arabmazar and Schmidt (1981).

[35] They estimate alcohol budget shares using a variation on the Tobit by assuming that the error terms follow the gamma distribution. This allows a variety of shapes for the density function as the skewness varies for a fixed standard deviation of the error term. Hence the Tobit is nested within the gamma-Tobit when the skewness of error terms equals 0.

[36] Another alternative is Powell's Symmetrically Trimmed Least Squares (STLS) estimator (Powell (1986); Chay and Powell (2001)).

truncate the normal distribution and allows for skewness in the untransformed dependent variable. This paper uses the log-normal transformation to address the problem of non-normalilty. The log-normal transformation has been found to reduce skewness in income distributions and thereby ameliorate concerns regarding non-normality of errors (van de Ven (1981); Azzalini et al (2003)). The first approach of specifying the error distribution was not used since the distribution of the error terms is almost always unknown, hence it is not always clear how one might re-specify the likelihood function in order to do better. Furthermore, while the CLAD estimator is appealing on theoretical grounds, it does not allow separate parametrization of the participation and consumption decision. It is also computationally very demanding and given the size of the dataset difficult to estimate within a reasonable period of time. In order to account for heteroskedasticity, all test statistics were calculated using robust standard errors based on Huber-White's method of quasi-maximum likelihood estimation, and clustered at the state level.

3.5.4 Econometric Specification

The econometric specification I use is Working-Lesser's (1943) Engel curve for items purchased by household i in state s and year t:

$$\ln a_{ist} = \alpha + \beta \ln X_{ist} + \gamma \ln N_{ist} + \lambda Z_{ist} + \mu P_{st} + \rho_s + \delta_t + \varepsilon_{ist} \tag{3.15}$$

where a is the measure of alcohol consumption, X is per capita real monthly household expenditure, N is household size, Z is a vector of household characteristics, P is prohibition policy and ρ and δ are state and year dummies. Household characteristics included are household caste (scheduled caste/tribe or general caste) and the sex, literacy, land ownership, age, marital status and occupation of the household head[37]. The state dummies were introduced to control for state-specific variables which may effect alcohol consumption, such as a high preference for liquor, and which if not controlled for may result in serial correlation in the error terms. The year dummies control for year-effects at the All-India

[37] Unfortunately, the NSS does not collect data on household religion for every round so it was excluded from the econometric analysis. A sample analysis found religion to be significantly related with alcohol participation with Muslim and Buddhist households drinking less relative to Sikhs, Hindus, and Christians.

level such as trade liberalization which may have increased alcohol consumption. State-year dummies were not included as this would have effectively removed much of the variation in the data and as it is difficult to think of state-specific time-varying variables which would systematically effect alcohol consumption[38]. The main source of variation in the existing model is therefore within state over time.

3.6 Prohibition and Alcohol Consumption

3.6.1 Pattern of Alcohol Consumption in India

Tables 3.3 and 3.4 report maximum likelihood estimates of the Heckman model for alcohol budget shares and quantity. Income, proxied by log per capita household expenditure, is positively and significantly associated with alcohol participation across all alcohol types with the probability of participation being higher for IMFL and beer, the luxury liquor types. The expenditure elasticity of quantity indicates that alcohol is a normal good with the elasticity varying by alcohol type. However, the expenditure elasticity of alcohol budget shares is negative which suggests that among households who consume, proportionate increases in income result in less than proportionate increases in alcohol budget shares. Taken together, this means that as income increases, quantity of alcohol consumed increases in proportion but the price paid falls. This may be due to lower costs of acquiring alcohol as income rises, for example due to bulk buying.

Overall, rural households have a significant preference for arrack and toddy relative to urban households and a lower preference for IMFL. The pattern of expenditure elasticities across alcohol types (not reported) across the sectors are similar, although alcohol as a whole, is more expenditure elastic in urban households.

The positive and significant coefficient on the log of household size is a measure of the economies of scale in consumption and indicates that larger households are also those that are more likely to consume alcohol. This suggests that when per capita expenditure is used, a large proportion of children may conceal the actual disposable income available to

[38] One possible state-time varying variable may be state and local elections in which alcohol is often distributed free to villagers.

consumers in the household who may wish to consume alcohol (Musgrave and Stern (1988)). This result is also consistent with a story that adult alcohol consumption is driven by the proportion of children in the household or some other factor which drives both consumption and fertility decisions.

Land ownership significantly increases participation and quantity consumed of total alcohol, particularly of arrack and toddy. It is not significant for IMFL and beer consumption which suggests that economic stratification by land owned is not an important determinant of demand for these alcohol types. Analysis by sector, shows that land ownership in general significantly increases rural alcohol consumption but significantly decreases urban alcohol consumption, reflecting the importance of land as a measure of asset ownership and wealth in the former relative to the latter.

Alcohol participation is, in general, significantly lower in female-headed households[39] and in households with a higher proportion of females[40]. It is also lower for households headed by older individuals, but significantly higher in households with married heads. Literate household heads imply significantly lower consumption of arrack and toddy but a strong preference for IMFL. Scheduled caste and scheduled tribe households are more likely to participate(or report) in consumption of all alcohol types relative to general castes[41]. This may be because as members of the lower castes in the caste system they are less bound by the Hindu principles of temperance which are most strictly enforced on the priestly (Brahmins) and higher castes. With respect to quantity demanded, scheduled castes and tribes consume significantly more arrack.

The pattern of alcohol consumption also varies across occupation of the household head (not reported). All occupations, except for service workers, consume significantly less alcohol and arrack than labourers. Consumption of toddy is also significantly less for professionals, administrative personal, executives and clerical and sales staff relative to labourers. After including all controls, we find that IMFL consumption is not significantly different for

[39] The sex-specificity of consumption is reflected somewhat in the observation that female-headed households report lower alcohol participation: 3.7% compared to 12.6% in male-headed households.

[40] See Chapter 4 for a detailed anlysis of household demographic composition on alcohol consumption and the differential effect of prohibition.

[41] Given that Chapter 2 found scheduled castes to be a significant determinant of prohibition while scheduled tribes were not, the estimates were run using separate SC and ST dummies. However, the results were similar for both groups and hence they were aggregated to increase the degrees of freedom in the estimation.

professionals relative to labourers, although the coefficients for other white-collar workers e.g. administrative and clerical staff, are positive.

3.6.2 Effect of Prohibition Policy on Alcohol Consumption

The regressions in Tables 3.5 to 3.8 report the effect of complete, partial, and arrack prohibition policy on alcohol participation and consumption. Since the estimated coefficients on the independent variables reported in Tables 3.3 and 3.4 do not change significantly, only coefficients for the prohibition variables are presented. The complete prohibition variable captures the effect of prohibition policy on alcohol budget shares and participation when all potable alcohol types are prohibited within that state, while the partial prohibition dummy captures the effect on each alcohol type when arrack alone is prohibited. The arrack prohibition variable estimates the effect on consumption for all periods for which arrack is prohibited (i.e. periods of complete and partial prohibition).

Overall, complete prohibition had a significant negative effect on total alcohol participation reducing it by approximately 26% (Column 2, Tables 3.5 and 3.7). There was a limited effect on total quantity consumed but a significant decrease in budget shares implying a decrease in alcohol price. Complete prohibition also decreased arrack participation by 50% and quantity consumed by 22%. There is also evidence of a significant increase of 18% in arrack budget shares. The direction of change of arrack consumption is similar when looking at periods of arrack prohibition. Prohibition increased toddy participation which is in line with toddy being home-produced and easy to substitute for other types of alcohol. Participation in IMFL and beer strongly decreased but the effect on quantity consumed was weak (Columns 4 and 6, Table 3.8). There was a positive and significant effect on the respective budget shares implying an increase in prices (Columns 4 and 6, Table 3.6).

The partial prohibition term captures the effect on alcohol demand when only arrack was prohibited. The estimates show that partial prohibition significantly decreased both participation and consumption (budget shares and quantity) of total alcohol (Column 2, Tables 3.5 and 3.7). The decrease in participation appears to be driven mainly by the large decrease in arrack which also experienced a significant decrease in quantity consumed. Partial prohibition of arrack also significantly decreased toddy participation in both sectors.

This may be due to some periods of arrack prohibition coinciding with toddy prohibition. On the other hand, participation in IMFL rose significantly by approximately 13%. This suggests that alcohol consumers substituted towards IMFL from arrack during period of partial prohibition but reduced consumption of both during complete prohibition.

The finding that prohibition decreased alcohol consumption is similar to findings for the US National Prohibition. Warburton (1932) estimated declines in consumption of approximately 30% in the first few years of prohibition, although consumption subsequently rose while remaining below pre-1920 levels. Thornton (1991) reviews the qualitative and available empirical literature for this period, and notes that consumption levels had increased to pre-1920 levels a few years after prohibition was lifted in 1933.

The results for India suggest that alcohol consumption during prohibition did not fall to zero which indicates a higher probability of consuming spurious liquor for the alcohol consuming population. Black market alcohol tends to be supplied through illegal manufacture of alcohol within the prohibited state or smuggled from non-prohibition states. While all illegal alcohol is not necessarily spurious, there is a higher probability of alcohol poisoning due to the lack of regulation of production, and the addition of chemicals and drugs to low-proof alcohol to give them an additional kick. Prohibition of alcohol may therefore result in specific alcohol-related health problems arising from drinking spurious liquor. This is a particularly relevant issue given that such negative effects are not typically associated with alternative alcohol policies such as taxation.

3.6.3 Incidence of Prohibition

Prohibition had differing effects on alcohol consumption depending on household characteristics including sectoral location, demographic composition, scheduled caste/tribe status, sex of the household head and literacy of household head (Table 3.9). Sector-specific analysis suggest that both complete and partial prohibition policy had a differential impact on participation in the rural and urban sector, with policy being significantly less effective in the rural sector, particularly for toddy and IMFL. This differential may be due to differences in the price elasticity of demand or in the effect of prohibition on the fixed costs of acquiring alcohol. The former may arise if preferences differ across sectors due to inherent tastes or

differences in quality e.g. in the strength of alcohol. *Ceteris paribus,* given a higher urban price elasticity a shift in supply due to prohibition would reduce consumption more relative to the rural sector.

The effect of prohibition on fixed costs may differ across sectors if, for example, it is harder to enforce prohibition policy in rural areas where home brewing is easier and where illicit liquor is more prevalent, due to geographical dispersion or fewer police staff per population or area. Fixed costs may also rise in the urban sector if there is a higher probability of consuming spurious liquor. As prohibition policies in the period studied were enforced throughout the state concurrently, the differential impact across the sectors does not capture a difference in the timing of the policy. They may, however, capture unobservable differences in underreporting across rural and urban areas e.g. if urban households were more conscious of breaking the law, contributing to a more negative urban prohibition coefficient. Nevertheless, reported consumption of alcohol is nonzero in urban households during prohibition periods and the effect on toddy is actually positive, suggesting that the observed sectoral differences are unlikely to result from systematic underreporting.

Prohibition had a differential effect on households with literate heads, whose total consumption of alcohol fell significantly. This is driven mainly by falls in toddy and IMFL consumption with literate household consuming less of these during prohibition periods. While complete prohibition impacted SC/ST households less relative to general households, partial prohibition led to a significant decrease in arrack consumption for SC/STs. There is also evidence of a significant increase in toddy and IMFL consumption for SC/ST households during this period. In spite of this the overall effect on alcohol consumption during partial prohibition is negative suggesting that arrack prohibition, to some extent, had its desired effect.

Prohibition significantly decreased alcohol consumption in households with relatively more males, which is expected given that men are the main consumers of alcohol in Indian society. There is also a differential affect by the sex of the household head. Consistent with the finding that female headed households are less likely to consume any form of alcohol, complete prohibition had less effect on alcohol consumption in these households[42]. This

[42]The only exception was for toddy whose consumption decreased relative to male-headed households

follows, as alcohol use in these cases may be very low making inference of change difficult, or inelastic due to households preferences or problems with alcohol addiction.

3.6.4 Robustness Checks

Under-reporting

As noted earlier, the dependent variable may suffer from underreporting. If underreporting is generated from a random process and independent of other right-hand-side variables in the analysis, its main effect is to result in inefficiently large standard errors. Thus, although the coefficient estimates will be non-biased it will increase the probability of Type 2 errors (i.e. failure to reject the null hypothesis that the coefficient is zero). In practice, due to the *sin* nature of alcohol consumption, underreporting is likely to be highly correlated with individual and household characteristics such as religion, caste, sex, wealth and literacy and as such is empirically indistinguishable from individual preferences. More importantly, underreporting may have a time series element which may effect the analyses of alcohol prohibition - individuals may deliberately report lower or no consumption of alcohol during prohibition due to the criminalization of consumption. This would result in any estimates of the effect of prohibition on consumption to be biased downwards.

In practise, this type of underreporting is likely to be limited as respondents to the NSS household survey have little incentives to underreport during prohibition. First, although prohibition legislation bans both consumption as well as production, it should be noted that enforcement is mainly concentrated on producers and that the penalties for consumption are much lower than for manufacturing or retailing liquor. For example, in Andhra Pradesh, the penalty for manufacturing liquor is imprisonment of at least 2 years and/or fines of at least Rs5000. The corresponding figures for consumption are imprisonment of at least 3 months and/or fines of at least Rs500. Secondly, in practise, the law is mainly applied to individuals arrested during raids on illegal arrack shops or found under the influence of alcohol and not enforced within residences or ex post. Furthermore, the limited extent of underreporting of illegal consumption is born out by widely documented reports of other

during prohibition.

illegal activities in the NSS surveys such as opium consumption and the payment of dowries, both of which are subject to large fines and imprisonment.

From an econometric perspective the problem of systematic underreporting is addressed by using instrumental variables which are selected to be highly correlated with prohibition but uncorrelated with the underreporting error and alcohol demand. However, it is difficult to find suitable proxies for state-level prohibition policies which fulfil this criteria such that it is both uncorrelated with underreporting and unrelated to alcohol consumption. The following section discusses potential instruments and the basic results from the instrumentation analysis.

Endogeneity

It could be argued that the results in Tables 3.5 to 3.8 may be subject to simultaneity bias as prohibition policy may not be exogenous to alcohol consumption. The analysis in Chapter 2 provides strong evidence that prohibition is not related to the negative effects associated with alcohol or the production of alcohol. By extension, this implies that the extent of alcohol demand within a state is not the main factor driving prohibition policy. However, in order to check the robustness of the results with respect to endogeneity concerns and address the issue of systematic underreporting, potential instruments for prohibition were examined based on the determinants of prohibition legislation found in Chapter 2. These include the timing of the electoral cycle, the sex and caste of legislatures, the size and location of the alcohol industry, the proportion of state excise, and the share of central excise. A priori, some of these variables are not suitable instruments for prohibition policy as they may also affect alcohol consumption directly. For example, as noted earlier, the electoral cycle may be associated with alcohol consumption as liquor is often distributed free as part of the campaigning strategy. In addition, state excise will tend to be higher where alcohol consumption is higher, while the share of central excise may be affected by preferences for addictive goods. Furthermore, the size of the alcohol industry and location of alcohol producers could be argued to be associated with alcohol consumption. Finally, the proportion of states with prohibition may indicate that non-prohibiting state are those with higher alcohol consumption or other non-observables related to alcohol preferences.

Of the set, the best candidate is the proportion of schedule caste legislatures which was found to be positively correlated with prohibition[43]. The results of the instrumented estimates do not find any significant effect of prohibition on alcohol consumption by type. This may be due to the lack of variation in the instrument over the sample period, given that the variable is constant between elections held approximately every five years. In addition, the proportion of scheduled caste politicians may not be exogenous to alcohol consumption in equilibrium, as higher consumption may result in more scheduled caste politicians being elected given their preferences for prohibition. The analysis therefore has not been fully tested for robustness, and the results should be interpreted bearing this caveat in mind. The arguments presented above do suggest that underreporting and endogeneity may not be as significant as thought. Nevertheless, future work will focus on finding suitable instruments to further check the robustness of these results.

Out-migration

It could be argued that the negative prohibition coefficient reflects out-migration of alcohol consumers to non-prohibition states rather than an actual decrease in consumption[44]. However, this is unlikely as out-of-state migration is mainly determined by ethnic and economic reasons rather than a sole preference for alcohol. Given that Indian states tend to be linguistically and culturally heterogeneous relative to one another this would imply low rates of migration for ethnic reasons alone[45]. If prohibition policy was accompanied by other socially restrictive policies, e.g. lack of religious freedom, freedom of information etc., the case for migration would be higher but this pattern in government policy can not be observed for the period of study.

[43] The proportion of female legislatures was not used as Chapter 2 has shown it is endogenous with respect to prohibition unless instrumented.

[44] An analysis of how prohibition affects migration figures was not possible as the main state migration figures are produced decennially in the Census of India.

[45] The 1956 States Reorganization Act arranged Indian states along cultural and linguistic lines and although there are disputed taluks, and hence "similar" villages, along state borders their relative populations are small. Thus it is unlikely that mass migration would be possible to these culturally similar areas in neighboring states without prohibition.

3.7 Unit Value Analysis

In order to test whether prohibition increases the price of alcohol, an analysis of the unit-value of each alcohol type was carried out for each sector. Unit values are computed by dividing total expenditures by total quantity consumed and, as such, differ from price as they are affected by the choice of quality. Thus, high-quality items, or mixtures that have a relatively large share of high-quality items, will have higher unit values. Following Prais and Houthakker (1955), Deaton (1997), and Deaton and Tarozzi (2000) I estimate the following specification of unit values:

$$\ln v_{ist} = \alpha + \beta \ln X_{ist} + \gamma \ln N_{ist} + \lambda Z_{ist} + \mu P_{st} + \rho_s + \delta_t + \varepsilon_{ist} \tag{3.16}$$

where $\ln v_{ist}$ denotes the log unit value of the item in household i in state s and year t and other variables are as defined in Equation 3.15. OLS estimates of this regression were calculated for all alcohol types. Each estimate was corrected for cluster effects at the state and village level which implicitly assumes that market prices do not vary within each village over the relevant reporting period. This is important as unit values vary with actual market prices hence omitting them would result in biased and inconsistent estimates (Deaton (1997)). The effect of alcohol prohibition on alcohol price was inferred by including a prohibition dummy in the unit value analysis[46]. As noted above, unit values are approximates to price due to the heterogeneity in quality even within narrowly defined groups. In the analysis which follows we are thus assuming that alcohol quality remains constant between prohibition and non-prohibition periods[47].

The estimates in Tables 3.10 and 3.11 suggest that the expenditure elasticity of quality is positive and differs across alcohol types - i.e. households with higher per capita monthly expenditure consume higher quality alcohol items as reflected by the higher unit value they pay. The effect of prohibition on the unit value differs by the type of alcohol and nature

[46] OLS estimates of the determinants of alcohol unit log values excluding prohibition variables were not reported as the main results are similar to when prohibition is included.

[47] This may be a strong assumption per se as supply during prohibition is partly through illicitly brewed liquor which may be of lower quality. Nevertheless, once costs of detection are factored into price it is assumed that total price will increase.

of prohibition in force. For total alcohol, complete prohibition significantly decreased unit values while partial prohibition significantly increased them. On the other hand, complete prohibition did not affect arrack unit values. The overall effect of arrack prohibition on arrack unit values is positive and significant and is driven mainly by increases during partial prohibition. The unit value of toddy decreased significantly during periods of complete and partial prohibition. The lower price may indicate a greater shift toward home-production of toddy when arrack or toddy itself is prohibited. Prohibition, both complete and partial, increased the unit value of IMFL. There is also a positive significant effect of complete prohibition on unit values of beer.

3.8 Policy Mechanism

Reconciling the above results to those from the effect of complete prohibition on consumption we can deduce that prohibition had a significant deterrent effect on total alcohol participation and a more limited effect on actual consumption. This follows despite the large decrease in alcohol unit values suggesting that the downwards demand shift due to higher fixed costs of consumption dominated any supply effect arising from prohibition. Complete prohibition also deterred arrack participation as well as quantity consumed. The lack of impact on unit values means that the demand decrease was offset completely by a decrease in supply. This resulted in the overall budget share of arrack increasing during complete prohibition. The increase in toddy consumption and decrease in price indicate an increase in toddy supply during complete prohibition, perhaps due to the ease of home-production and low detection rates. On the other hand, it is clear that there was an upwards supply shift dominating any demand decrease for IMFL and beer as reflected by the increase in unit values and decrease in participation. This is corroborated by the increase in the budget shares of households consuming IMFL and beer during prohibition.

The limited effects on quantity consumed for all alcohol aside from arrack mean that there were no significant changes in the magnitude of alcohol demand among those consuming during complete prohibition periods. This may be because those continuing to participate in consumption during prohibition are those households with more inelastic al-

cohol demand functions. The significant changes in budget shares are therefore the result of the changes in unit values, *ceteris paribus.*

During partial prohibition, supply shifts dominated in affecting alcohol demand, particularly for arrack. This resulted in an increase in arrack unit values and a corresponding decrease in participation and quantity demanded. Interestingly, participation of IMFL increased by 13% during the prohibition of arrack. This together with the increase in IMFL unit values indicates an upward shift in demand as consumers substitute IMFL for arrack. Partial prohibition, decreased participation in both toddy and beer which suggests that they are complements to arrack. The decrease in toddy may also be due to some periods of arrack prohibition coinciding with toddy prohibition which could not be separately identified. However, when all alcohol is prohibited, the increase in toddy consumption reflects the relative utility of any alcohol consumption.

Overall, arrack prohibition significantly decreased both participation and quantity of arrack consumed, and increased unit values. The latter suggests that the effectiveness of the policy arose mainly from a decrease in supply during prohibition, although there may have also been demand effects. This drove the overall decrease in total alcohol consumption which was somewhat mitigated by the increase in demand for IMFL as consumers substituted away from arrack during partial prohibition. Nevertheless, the results are promising for arrack prohibition, given arrack's large share in alcohol and its high proof relative to the other alcohol types.

These results suggest that prohibition affects consumption in two ways - by inducing an upwards shift in supply which increases the producer price faced by the consumer and by increasing the fixed cost of alcohol demand (c in the model) which results in a downwards shift in demand. The relative importance of each depends on the type of prohibition enacted and the liquor type. For complete prohibition, the demand effect on arrack participation dominates and is reinforced by decreases in supply. On the other hand, for IMFL and beer supply effects dominate any demand shifts. For partial prohibition of arrack, the supply effect dominates any decrease in demand. The importance of the demand shift during complete prohibition indicates that prohibition has a significant deterrent effect, in that households are less likely to consume liquor even if available, during prohibition periods.

This result is particularly significant given that prohibition is traditionally modelled as working mainly through constraining supply (Thornton (1991)). The policy implications are that the estimated decrease in consumption are larger than anticipated from the supply effect alone. This means that similar decreases in alcohol consumption can not easily be replicated using taxation unless very large producer taxes are enforced.

3.9 Alcohol and Addictive Goods Consumption

There is extensive literature on the cross-price effects of alcohol demand with respect to cigarette and drug consumption. These studies find conflicting results with respect to the nature of the relationship between alcohol and these addictive goods. Some authors, find that alcohol and cigarettes are economic complements while others find evidence of substitution[48]. In a similar vein, some studies of drug consumption find a positive relationship between US beer taxes and marijuana consumption[49]. More recently however, Pacula (1998a; 1998b) finds that youth consumption of alcohol and marijuana are complementary.

The nature of the relationship between alcohol and the consumption of other addictive goods is important to assess the spillover effects, if any, of alcohol policy[50]. If alcohol and these goods are economic substitutes, then an effective prohibition policy will unintentionally increase the consumption of other addictive goods which, given their associated negative effects, would have to be controlled using alternative policies. On the other hand, if addictive substances are a complement to alcohol, decreased alcohol consumption will have a greater positive impact on health than if it was consumed alone and there is a stronger case for curtailing consumption.

The additive goods examined are total tobacco items, bidis, leaf tobacco, cigarettes and pan. Smoking is associated with increased risk of lung, throat, and stomach cancer and

[48] See Dee (1999); Decker and Schwartz (2000); Shew-Jiun and Yen (2000); and Cameron and Williams (2001).

[49] See, for example, DiNardo and Lemieux, (1992); Chaloupka and Laixuthai (1994); Thies and Register (1993); Farrelly et al (1999).

[50] Some studies for the US find that policies restricting the availability of alcohol in the 1990s have increased the consumption of marijuana by adolescents suggesting that they may be economics substitutes. See DiNardo and Lemieux (1992); Chaloupka and Laixuthai (1992). Others imply that early use of alcohol encourage adolescents to experiment with marijuana, implying that they are economic complements (Kandel and Maloff (1983); Ellickson and Hays (1991)).

is considered to be highly addictive. As such, tobacco items are obvious candidates for study. In addition, the breakdown by type of item is interesting as bidis and leaf tobacco contain more nicotine relative to cigarettes. Approximately 59% of households in the sample report tobacco consumption with the majority of tobacco consumers consuming bidis (58%) followed by leaf tobacco (32%) and cigarettes (13%). Together these items comprise 90% of all tobacco items consumed. Household preferences appear to be limited to particular forms of tobacco with only 10% of smoking households smoking more than one type of tobacco.

Pan is also considered to be an additive substance with negative health effects, although the magnitude and nature of these are not widely documented[51]. Given that pan is often chewed as a mouth refresher after drinking or smoking, there is reasonable grounds to assume a relationship between its consumption and drinking. 32% of the sample reports pan consumption. As with alcohol there is a distinct sectoral split to pan and tobacco demand, being significantly higher in the rural sector. Cigarettes are the only exception, being more popular in urban areas. There is also substantial variation in consumption rates across states with Punjab having a tobacco participation rate of 27% and Assam of 74%; and pan participation rates of 3.3% and 83% respectively.

The consumption patterns across the set of addictive goods suggests that on the whole tobacco and pan are complements to alcohol. Households consuming alcohol are significantly more likely to also consume tobacco relative to those who don't (84% of alcohol consuming households smoke compared to 56% of tee-total households) and vice versa (17% of smoking households consume alcohol compared to 4.7% of non-smoking households). A similar pattern is found for pan - 39% of drinking households also consume pan compared to 30% of tee-total households while 14%% of pan consuming households also drink relative to 10% of non-pan consuming households. In all cases the difference in proportions is significant.

The determinants of addictive goods consumption estimated using a specification similar to Equation 3.15 are reported in Table 3.12. Expenditure elasticities for participation are positive for total tobacco and pan, although there is substantial variation across tobacco types. Amongst those who participate, the expenditure elasticity of budget shares

[51] Pan is thought to have detrimental effects on dental and mental health and lead to mouth cancer. However, the negative externalities associated with pan consumption are much lower than for tobacco and alcohol.

is negative implying that richer households spend proportionately less on addictive goods than poorer ones. Across sectors, rural households are more likely to participate in tobacco and pan consumption but significantly less likely to consume cigarettes - the luxury tobacco type. Female headed households tend to consume less of all tobacco items and pan, while landed household and households with older heads tend to consume less bidis and cigarettes but significantly more leaf tobacco and pan. Educated households consume more cigarettes while scheduled caste/tribe households consume more bidis and leaf tobacco. There are also differential consumption patterns by occupation with most groups, aside from farmers, consuming significantly more cigarettes and less bidis and leaf tobacco relative to labourers.

The relationship between alcohol consumption and addictive consumption is analysed by estimating the following model:

$$I_{ist} = \alpha + \kappa a_{ist} + \beta \ln X_{ist} + \gamma \ln N_{ist} + \lambda Z_{ist} + \rho_s + \delta_t + \varepsilon_{ist} \tag{3.17}$$

where a_{ist} is household alcohol participation, I_{ist} is reported participation in consumption of the addictive good, and the other variables are as previously described. Reported participation is the measure of consumption used as the previous analysis has shown that prohibition has the greatest impact on this aspect of demand. In addition, measurement error problems are assumed to be lower relative to quantity consumed or household budget shares[52]. A potential source of bias remains if households systematically underreport participation in the consumption of one item relative to the other. This is plausible in the Indian context where alcohol consumption is considered more taboo than consumption of the other addictive goods studied. The effect of this would be to underestimate the strength of the relationship between the goods and hence the estimates should be considered as the lower bound to the true cross-effect.

It is clear that this specification is not suitably identified as its excludes important unobservables which may influence both alcohol and addictive good participation such as an idiosyncratic rate of time preference. In order to overcome this, Equation 3.17 was estimated

[52]The problem of measurement error may be significant particularly for budget share analysis as errors in total expenditures would result if the residual and independent variables were correlated. This would give rise to biased, inconsistent estimates.

using a probit model with alcohol prohibition (complete and partial) as an instrument for alcohol consumption. The advantage of using prohibition over alcohol price arises due to the orthogonality of the policy with respect to latent variables which drive both alcohol and addictive goods participation. This overcomes the problem of omitted variable bias that is present when directly estimating the cross-price effect, for example, if a decrease in aggregate income is driving both, and enables consistent estimates of the effect of alcohol consumption on addictive consumption. As shown earlier, prohibition is highly associated with alcohol participation and results in a relatively large variation in alcohol consumption making it statistically easier to estimate the nature of the relationship. If we assume that the unobservable determinants of alcohol and addictive participation have a positive covariance then the coefficient estimated in Equation 3.17 will overstate the true relationship between the two goods. They would therefore constitute an upper bound to the instrumental variables estimates in the absence of misspecification.

Instrumental variables probit estimates of Equation 3.17 are reported in Table 3.13 with complete, partial and arrack prohibition being the instruments for alcohol participation by type[53]. Note that this table concentrates only on the coefficients of alcohol participation for space considerations and as the estimates for the other explanatory variables did not change significantly from those in Table 3.12. In estimating the model, there are issues of non-linearities arising from the instrumentation of a dichtomous variable like alcohol participation. Following Angrist (2000) the analysis therefore reports on the nature, rather than the magnitude, of the relationship between the variables.

The broad relationship between alcohol and tobacco and alcohol and pan is complementary and highly significant. The positive relationship also holds for bidis and leaf tobacco but not for cigarettes which is strongly negatively associated with all types of alcohol participation. Amongst households consuming alcohol, those who consume IMFL are significantly less likely to consume the addictive goods considered in this analysis. This is in line with more educated households heads consuming IMFL and education being related to lower

[53]OLS instrumental variables estimates were also carried out but not reported as probit estimates take into account the dichtomous nature of the variables. Where more than one instrument was available, overidentification tests were carried out. These found the identifying restrictions to hold for most cases, the exception being for beer and cigarettes.

demand for both alcohol and tobacco. Beer participation is also negatively associated with participation in bidi and cigarette consumption.

Given the relationship between alcohol and tobacco and pan we would expect prohibition policy to have a significant impact on demand for these addictive goods. Reduced-form estimates of the effect of prohibition on these addictive goods are reported in Tables 3.14 and 3.15. Complete prohibition significantly decreased participation in total tobacco consumption as we would expect given our above finding that tobacco is a complement to alcohol. However, the magnitude of the effect is small at 4%. Across tobacco types, prohibition increased bidi participation, suggesting that the strong relationship between bidi and toddy consumption dominated any decrease due to the drop in arrack consumption during prohibition. On the other hand, as expected, complete prohibition significantly decreased leaf tobacco consumption by approximately 26%. It also increased cigarette consumption by 8%. The latter result most likely being driven by the decrease in arrack , and to a smaller extent, beer consumption during prohibition resulting in households smoking more.

The impact of partial prohibition was larger, with total tobacco participation dropping by 18%, mainly due to the fall in leaf tobacco consumption of 34%. This is as expected given the strong relationship between arrack and leaf tobacco found in Table 3.13. In spite of this, the overall impact of partial prohibition on tobacco budget shares was positive and significant.

The effect of prohibition on pan was to significantly reduce participation which is expected given the complementary nature of the relationship between pan and alcohol. Complete prohibition decreased pan consumption by 12% and partial prohibition by 28%. Complete prohibition had limited effects on budget shares but partial prohibition increased these significantly.

3.10 Conclusion

Assessing policy tools for curtailing alcohol consumption is important given the sharp rise in alcohol related illnesses and deaths over the last two decades. This paper added to the existing literature by examining the effect of an under-researched policy tool used to

affect consumption - alcohol prohibition. Using a series of household expenditure surveys for India, the analysis found that alcohol prohibition had differential effects on alcohol by type of prohibition enacted and liquor group. Complete prohibition reduced participation and consumption of arrack, IMFL and beer, although it increased consumption of toddy - the local home brew. While supply shifts resulted from prohibition, the main mechanism through which demand decreased was through demand shifts resulting from the higher fixed costs of consumption. On the other hand, during partial prohibition supply shifts dominated any decrease in demand due to fixed costs. In particular, partial prohibition decreased arrack, toddy and beer participation and lead to an increase in IMFL demand as consumers substituted away from arrack towards its nearest substitute. This suggests that partial prohibition has important spillover effects on the consumption of other liquor types which may have to be controlled using alternative measures such as higher taxes.

The finding that demand decreases, not only due to the increase in price resulting from the reduction in supply, but due to a deterrent effect of prohibition has several implications. First, it indicates that very high taxes would need to be implemented on production in order to achieve similar decreases in consumption via taxation. Secondly, it suggests that the design of alternative policies to prohibition should also focus on increasing the fixed costs of consumption, in addition to factors which affect price. These could include requiring consumers to purchase a liquor license, regulating the location of bars to be a suitable distance from the village/community centre, or limiting the number of retailers within a given area. Finally, the result indicates that prohibition causes a greater effect on consumption than estimated from the supply effect alone. The implication for the consumption of other prohibited goods such as drugs, is that lifting prohibition may result in a greater change in demand than expected from the price effect in isolation.

An analysis of the relationship between alcohol type and specific addictive goods indicates the existence of strong associations between most of these items. Estimates using prohibition as an instrument for alcohol consumption suggest that overall alcohol and tobacco and alcohol and pan are complements although the direction of the relationship differs by alcohol type and tobacco item. In particular, bidis and leaf tobacco are a complement to arrack and toddy and a substitute to IMFL in both sectors. On the other hand, cigarettes

are a strong substitute for all alcohol items in both sectors. Pan appears to be complementary to arrack, toddy and beer but a substitute for IMFL. Consequently, as shown by the reduced-form estimates, prohibition had significant spill-over effects on the consumption of these items and is associated with a decrease in overall demand for tobacco and pan. Amongst tobacco items, prohibition decreased leaf tobacco consumption and increased cigarette and bidi consumption - the latter being a substitute for IMFL and complementary to toddy. Given that bidi and cigarette consumption is already high in India and that the associated negative health effects of increased tobacco consumption are substantial, this is a worrying side-effect. It also highlights the dangers of undertaking isolated policies to curtail alcohol demand, which exhibits strong associations with other harmful addictive goods, without incorporating measures to counter the unintended negative spillover effects of policy.

3.11 Appendix 1: Data Appendix

The consumption and household characteristics dataset is compiled from 13 Consumer-Expenditure Schedules of the National Sample Survey of India (NSS) conducted by the National Sample Survey Organization of India. These correspond to the following years: 38th Round Schedule 1.0 (1983), 43th Round Schedule 1.0 (1987-88), 45th Round Schedule 1.0 (1989-90), 46th Round Schedule 1.0 (1990-91), 47th Round Schedule 1.0 (1991-92), 48th Round Schedule 1.0 (1992), 49th Round Schedule 1.0 (1993), 50th Round Schedule 1.0 (1993-94), 51th Round Schedule 1.0 (1994-95), 52th Round Schedule 1.0 (1995-96), 53th Round Schedule 1.0 (1997), 54th Round Schedule 1.0 (1998), 55th Round Schedule 1.0 (1999-00).

The sample for analysis comprises of 600618 households in the 16 major states. These are Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Jammu and Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, and West Bengal. The sample excludes households reporting per capita expenditures lying the top and botton 0.05 percentile of the distribution to ensure results are not excessively influenced by outliers. In addition, the consumption variables were cleaned for

outliers if budget shares of individual items were greater than total expenditures.

Consumption figures are based on 30-day recall and cover cash purchase and home grown consumption.

Participation is based on positive reports of alcohol consumption in the last 30-days.

Quantity consumed is based on litres per 30-day recall. For total alcohol this is aggregated across all alcohol types.

Unit Values are calculated by dividing expenditure by quantity.

Per capita monthly household expenditure is calculated from total monthly expenditures divided by total number of household members.

Household size comprises total number of individuals residing in the household.

Sex of head is a dummy of the gender of the reported household head.

Age of head is the age in years of the reported household head.

Literacy of head is a categorical variable measuring the education of the household head as follows: 0=Not literate, 1=Literate without formal schooling, 2=Literate below primary, 3=Primary, 4=Middle, 5=Secondary, 6=Graduate and above.

Marital Status of head is a categorical variable reflecting the marital status of the household head as follows: 1= Single/never married, 2= Married, 3=Divorced/separated, 4=Widowed.

Land ownership is a dummy equal to one for households with more than 1 acre of land.

Scheduled Caste/Tribe is a dummy for households classified as Scheduled Caste or Scheduled Tribe.

Rural dummy is a dummy for the rural sector as defined by the NSS sample frame.

Occupation dummies are dummies for the following categories: Professional, Administrative/Executive/Managerial, Clerical, Sales, Service Workers, Farmers, Production Workers, Labourers.

Figure 3-1: Distribution of Total Alcohol Budget Shares

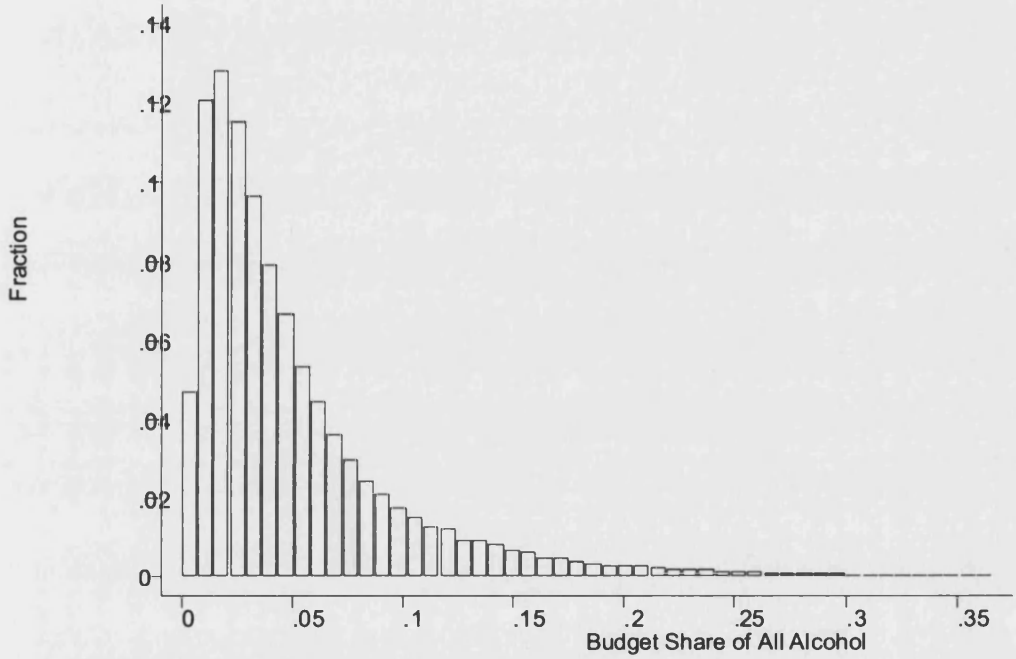

Figure 3-2: Reported Alcohol Participation In Indian States

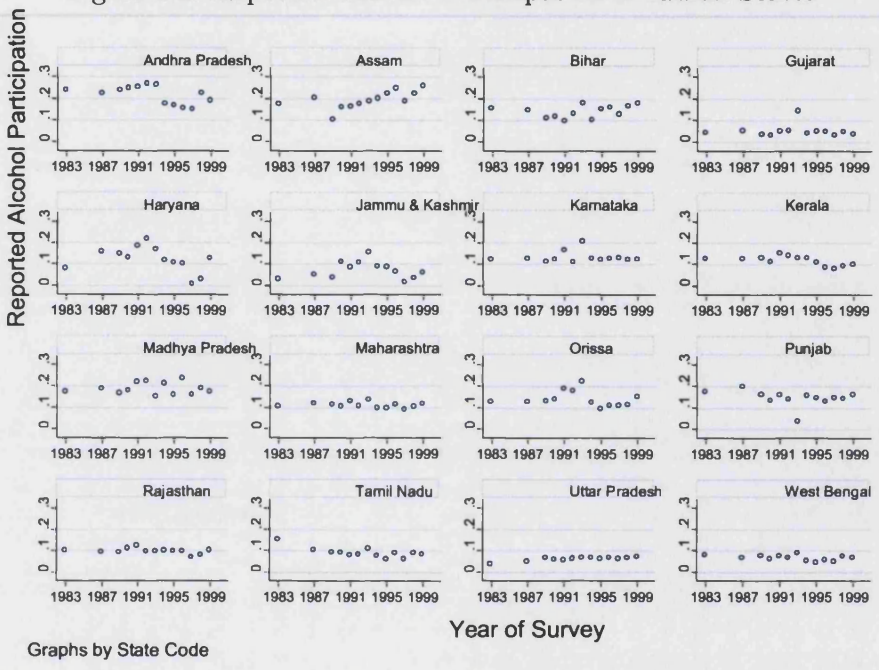

Table 3.1: Summary of Main Variables

Main Variables	Mean	S.d.
Complete Prohibition	0.079	0.270
Arrack Prohibition	0.193	0.395
Partial Prohibition	0.114	0.318
Budget Share Total Alcohol	0.051	0.047
Budget Share Arrack	0.049	0.046
Budget Share Toddy	0.045	0.044
Budget Share IMFL	0.053	0.047
Budget Share Beer	0.039	0.036
Quantity Alcohol	10.102	31.413
Quantity Arrack	8.603	31.555
Quantity Toddy	13.376	20.427
Quantity IMFL	1.999	9.964
Quantity Beer	5.139	10.230
Reported Participation Alcohol	0.121	0.326
Reported Participation Arrack	0.086	0.281
Reported Participation Toddy	0.026	0.158
Reported Participation IMFL	0.012	0.107
Reported Participation Beer	0.004	0.062
Budget Share Total Tobacco	0.025	0.024
Budget Share Bidis	0.027	0.022
Budget Share Leaf Tobacco	0.011	0.011
Budget Share Cigarettes	0.030	0.030
Budget Share Pan	0.017	0.017
Reported Participation Total Tobacco	0.612	0.487
Reported Participation Bidis	0.354	0.478
Reported Participation Leaf Tobacco	0.197	0.398
Reported Participation Cigarettes	0.075	0.264
Reported Participation Pan	0.324	0.468

Table 3.1 Cont: Summary of Main Variables

Main Variables	Mean	S.d.
Log Unit Value Alcohol	2.644	1.478
Log Unit Value Arrack	2.754	1.371
Log Unit Value Toddy	1.323	0.837
Log Unit Value IMFL	4.628	0.880
Log Unit Value Beer	3.104	1.081
Log P.C. Household Expenditure	5.633	0.779
Log Household Size	1.501	0.558
Sex of Head	0.080	0.272
Age of Head	44.155	13.313
Literacy of Head	2.200	2.111
Marital Status of Head	2.073	0.378
Land Ownership	0.602	0.489
Scheduled Caste/Tribe	0.243	0.429
Rural Sector Dummy	0.628	0.483
Total Observations	600618	

Table 3.2: Alcohol, Tobacco and Pan Consumption In Indian States, 1983-2000

States	Alcohol		Tobacco			Pan	
	%	Budget Share	Quantity ltr	%	Budget Share	%	Budget Share
Andhra Pradesh	21.09	5.91	18.37	57.21	4.11	18.10	1.90
Assam	21.59	4.74	9.09	75.19	1.81	83.50	2.10
Bihar	14.84	3.94	8.57	68.22	1.70	29.65	1.23
Gujarat	5.05	5.21	8.65	55.73	3.15	18.60	2.20
Haryana	11.14	5.29	12.91	64.16	2.80	3.44	1.68
Jammu & Kashmir	5.52	5.42	10.33	69.11	2.76	1.02	1.05
Karnataka	12.82	6.45	11.55	52.17	2.98	44.29	1.82
Kerala	11.76	4.30	5.11	52.88	2.87	21.84	1.74
Madhya Pradesh	19.04	4.30	5.11	70.14	2.28	50.35	1.33
Maharashtra	10.89	4.75	5.36	55.65	1.93	49.21	1.35
Orissa	13.47	4.57	6.58	74.11	1.36	44.11	2.06
Punjab	16.65	5.72	16.95	27.44	3.22	3.39	2.05
Rajasthan	9.81	5.86	11.34	64.68	3.48	11.00	1.52
Tamil Nadu	9.54	5.84	9.20	42.88	2.75	29.77	2.17
Uttar Pradesh	5.93	4.86	8.28	68.25	2.47	31.19	1.69
West Bengal	6.35	4.73	7.32	72.41	2.48	34.33	1.32
Total	**12.11**	**5.07**	**10.10**	**61.23**	**2.53**	**32.40**	**1.66**

Table 3.3: Heckman Maximum Likelihood Estimates of Log Alcohol Budget Share

	Part A: Participation				
	(1) Total Alcohol	(2) Arrack	(3) Toddy	(4) IMFL	(5) Beer
Log P.C. Expenditure	0.401	0.294	0.120	0.761	0.617
	(59.490)	(38.890)	(9.440)	(63.030)	(29.780)
Log Household Size	0.233	0.205	0.150	0.342	0.254
	(42.270)	(33.420)	(14.610)	(28.170)	(12.530)
Sex of Head	-0.691	-0.683	-0.561	-0.356	-0.144
	(49.810)	(44.030)	(24.730)	(10.040)	(2.590)
Age of Head	-0.006	-0.006	-0.004	-0.002	-0.006
	(27.780)	(24.800)	(10.510)	(3.760)	(7.780)
Education of Head	-0.102	-0.105	-0.129	0.011	0.001
	(61.430)	(56.480)	(38.510)	(3.050)	(0.090)
Marital Status of Head	0.089	0.100	0.032	0.062	-0.042
	(11.360)	(11.970)	(2.260)	(3.160)	(1.340)
Land Ownership	0.017	0.019	0.057	-0.008	-0.036
	(2.390)	(2.360)	(4.280)	(0.560)	(1.570)
Scheduled Caste/Tribe	0.660	0.642	0.435	0.153	0.386
	(95.200)	(84.670)	(35.340)	(9.500)	(14.110)
Rural Dummy	0.121	0.121	0.301	-0.054	-0.027
	(13.820)	(12.320)	(15.590)	(3.150)	(0.910)

Notes: Z-statistics calculated with robust standard errors clustered at the state-level in parenthesis. All estimates include occupation, year and state dummies. Total sample size is 600618.

Table continues on next page.

Table 3.3 Cont: Heckman Maximum Likelihood Estimates of Log Alcohol Budget Share

	Part B: Consumption				
	(1) Total Alcohol	(2) Arrack	(3) Toddy	(4) IMFL	(5) Beer
Log P.C. Expenditure	-0.113	-0.184	-0.253	-0.819	-0.447
	(9.210)	(13.810)	(10.390)	(12.300)	(6.710)
Log Household Size	-0.403	-0.428	-0.500	-0.752	-0.480
	(44.190)	(41.880)	(25.430)	(21.370)	(9.820)
Sex of Head	-0.172	-0.128	-0.151	0.269	0.090
	(6.930)	(4.410)	(3.160)	(4.050)	(0.980)
Age of Head	0.001	0.001	0.001	0.005	0.001
	(0.240)	(1.020)	(1.770)	(5.170)	(0.070)
Education of Head	-0.031	-0.030	-0.045	0.007	-0.016
	(10.380)	(9.210)	(6.080)	(1.020)	(1.270)
Marital Status of Head	0.051	0.060	0.027	-0.063	-0.125
	(4.250)	(4.390)	(0.920)	(1.710)	(2.220)
Land Ownership	-0.049	-0.080	-0.017	0.012	-0.035
	(5.250)	(7.120)	(0.840)	(0.440)	(0.650)
Scheduled Caste/Tribe	0.117	0.072	0.038	-0.129	-0.106
	(7.950)	(4.670)	(1.540)	(3.790)	(1.660)
Rural Dummy	-0.078	-0.095	-0.020	0.016	-0.037
	(6.420)	(6.660)	(0.630)	(0.550)	(0.590)
Log Likelihood	-284050.4	-216758.2	-71816.35	-38760.07	-13851.95
Inverse Mills	0.183	0.099	0.076	-0.816	-0.197
Wald Test	76.10	25.31	3.35	94.12	4.48
	(0.000)	(0.000)	(0.067)	(0.000)	(0.034)
Uncensored Obs	72473	51649	15124	6724	2023

Notes: Z-statistics calculated with robust standard errors clustered at the state-level in parenthesis. All estimates include occupation, year and state dummies. Total sample size is 600618.

Table 3.4: Heckman Maximum Likelihood Estimates of Log Alcohol Quantity

	Part A: Participation				
	(1) Total Alcohol	(2) Arrack	(3) Toddy	(4) IMFL	(5) Beer
Log P.C. Expenditure	0.405	0.298	0.118	0.757	0.614
	(60.410)	(39.780)	(9.290)	(62.310)	(29.570)
Log Household Size	0.229	0.200	0.145	0.335	0.253
	(41.770)	(32.960)	(14.140)	(26.970)	(12.420)
Sex of Head	-0.693	-0.682	-0.565	-0.352	-0.147
	(50.130)	(44.310)	(24.830)	(9.940)	(2.630)
Age of Head	-0.006	-0.006	-0.004	-0.002	-0.006
	(27.760)	(24.670)	(10.510)	(3.740)	(7.830)
Education of Head	-0.102	-0.104	-0.129	0.011	0.001
	(61.570)	(56.460)	(38.460)	(3.170)	(0.080)
Marital Status of Head	0.089	0.100	0.032	0.063	-0.041
	(11.350)	(12.020)	(2.230)	(3.210)	(1.310)
Land Ownership	0.018	0.020	0.058	-0.009	-0.033
	(2.490)	(2.480)	(4.390)	(0.590)	(1.430)
Scheduled Caste/Tribe	0.653	0.634	0.435	0.151	0.384
	(94.420)	(84.050)	(35.340)	(9.320)	(13.930)
Rural Dummy	0.124	0.123	0.305	-0.053	-0.029
	(14.170)	(12.560)	(15.780)	(3.080)	(0.980)

Notes: Z-statistics calculated with robust standard errors clustered at the state-level in parenthesis. All estimates include occupation, year and state dummies. Total sample size is 600618.

Table continues on next page.

Table 3.4 Cont: Heckman Maximum Likelihood Estimates of Log Alcohol Quantity

	Part B: Consumption				
	(1) Total Alcohol	(2) Arrack	(3) Toddy	(4) IMFL	(5) Beer
Log P.C. Expenditure	0.926	1.023	0.602	0.494	0.539
	(45.650)	(47.530)	(21.250)	(10.540)	(7.820)
Log Household Size	0.674	0.724	0.452	0.332	0.476
	(44.230)	(42.400)	(19.960)	(10.240)	(8.720)
Sex of Head	-0.893	-1.027	-0.100	-0.053	-0.064
	(21.990)	(22.000)	(1.810)	(0.730)	(0.570)
Age of Head	-0.006	-0.007	0.002	0.006	0.001
	(10.850)	(11.980)	(1.970)	(5.520)	(0.080)
Education of Head	-0.181	-0.170	-0.054	0.011	-0.055
	(35.010)	(30.390)	(6.150)	(1.490)	(3.500)
Marital Status	0.147	0.200	0.033	0.005	-0.077
of Head	(7.510)	(8.770)	(0.950)	(0.110)	(1.120)
Land Ownership	0.064	0.050	0.071	0.005	-0.063
	(3.800)	(2.480)	(3.010)	(0.190)	(0.980)
Scheduled	0.868	1.048	-0.011	0.043	0.084
Caste/Tribe	(32.850)	(41.010)	(0.370)	(1.150)	(1.170)
Rural Dummy	0.278	0.152	0.102	0.017	0.162
	(12.530)	(6.000)	(2.750)	(0.500)	(2.080)
Log Likelihood	-310926.4	-232619	-73557.22	-39788.98	-14182.69
Inverse Mills	1.485	1.731	-0.048	-0.034	-0.096
Wald Test	1630.06	2762.90	0.830	0.340	1.960
	(0.000)	(0.000)	(0.363)	(0.562)	(0.161)
Uncensored Obs	72140	51394	15081	6661	2011

Notes: Z-statistics calculated with robust standard errors clustered at the state-level in parenthesis. All estimates include occupation, year and state dummies. Total sample size is 600618. Uncensored sample differs from budget share sample as quantity consumed is not available for all households.

Table 3.5: Heckman Maximum Likelihood Estimates of the Effect of Prohibition on Log Alcohol and Arrack Budget Shares

	Total Alcohol			Arrack		
	(1)	(2)	(3)	(4)	(5)	(6)
Participation						
Complete Prohibition	-0.170	-0.259		-0.414	-0.502	
	(7.380)	(10.690)		(12.660)	(14.830)	
Partial Prohibition		-0.263			-0.406	
		(13.940)			(18.650)	
Arrack Prohibition			-0.261			-0.438
			(15.710)			(21.950)
Log P. C. Expenditure	0.400	0.402	0.402	0.292	0.295	0.295
	(59.370)	(59.690)	(59.670)	(38.710)	(39.010)	(39.040)
Consumption						
Complete Prohibition	-0.084	-0.111		0.183	0.175	
	(2.510)	(3.150)		(3.370)	(3.200)	
Partial Prohibition		-0.072			0.011	
		(3.170)			(0.330)	
Arrack Prohibition			-0.084			0.066
			(3.910)			(2.110)
Log P. C. Expenditure	-0.113	-0.107	-0.107	-0.184	-0.181	-0.182
	(9.270)	(8.790)	(8.760)	(13.800)	(13.470)	(13.470)
Log Likelihood	-283974	-283711	-283712	-216497	-216113	-216132
Inverse Mills	0.184	0.200	0.200	0.097	-0.176	0.110
Wald Test	76.44	92.20	92.36	24.22	0.109	27.41
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Uncensored Obs	72473	72473	72473	51649	51649	51649

Notes: Z-statistics calculated with robust standard errors clustered at the state-level in parenthesis. All estimates include occupation, year and state dummies. Total sample size is 600618.

Table 3.6: Heckman Maximum Likelihood Estimates of the Effect of Prohibition on Log Toddy, IMFL, and Beer Budget Shares

	Toddy		IMFL		Beer	
	(1)	(2)	(3)	(4)	(5)	(6)
Participation						
Complete Prohibition	0.175	0.071	-0.333	-0.274	-0.381	-0.448
	(5.230)	(1.970)	(6.530)	(5.290)	(3.920)	(4.300)
Partial Prohibition		-0.217		0.132		-0.144
		(7.540)		(4.380)		(2.750)
Log P. C. Expenditure	0.122	0.125	0.761	0.760	0.617	0.617
	(9.580)	(9.800)	(62.940)	(62.890)	(29.690)	(29.720)
Consumption						
Complete Prohibition	-0.063	-0.049	0.449	0.422	0.394	0.514
	(1.140)	(0.820)	(4.430)	(4.060)	(2.120)	(2.740)
Partial Prohibition		0.022		-0.066		0.305
		(0.510)		(1.150)		(2.790)
Log P. C. Expenditure	-0.254	-0.254	-0.818	-0.822	-0.452	-0.450
	(10.440)	(10.410)	(12.230)	(12.420)	(6.700)	(6.880)
Log Likelihood	-71779	-71692	-38718	-38704	-13833	-13823
Inverse Mills	0.066	0.078	-0.816	-0.821	-0.206	-0.209
Wald Test	2.19	3.15	92.59	96.42	4.64	5.22
	(0.139)	(0.076)	(0.000)	(0.000)	(0.031)	(0.022)
Uncensored Obs	15124	15124	6724	6724	2023	2023

Notes: Z-statistics calculated with robust standard errors clustered at the state-level in parenthesis. All estimates include occupation, year and state dummies. Total sample size is 600618.

Table 3.7: Heckman Maximum Likelihood Estimates of the Effect of Prohibition on Log Alcohol and Arrack Quantity

	Total Alcohol			Arrack		
	(1)	(2)	(3)	(4)	(5)	(6)
Participation						
Complete Prohibition	-0.180	-0.266		-0.419	-0.506	
	(7.880)	(11.060)		(12.910)	(15.060)	
Partial Prohibition		-0.253			-0.400	
		(13.420)			(18.430)	
Arrack Prohibition			-0.259			-0.435
			(15.560)			(21.890)
Log P. C. Expenditure	0.404	0.407	0.407	0.297	0.299	0.300
	(60.350)	(60.680)	(60.600)	(39.610)	(39.920)	(39.960)
Consumption						
Complete Prohibition	0.294	0.115		-0.065	-0.221	
	(5.120)	(1.900)		(0.680)	(2.280)	
Partial Prohibition		-0.525			-0.904	
		(10.420)			(14.040)	
Arrack Prohibition			-0.317			-0.678
			(7.120)			(11.040)
Log P. C. Expenditure	0.935	0.942	0.926	1.021	1.026	1.024
	(46.460)	(46.590)	(45.520)	(47.580)	(47.880)	(47.530)
Log Likelihood	-310696	-310401	-310599	-232299	-231870	-232005
Inverse Mills	1.508	1.513	1.482	1.725	1.726	1.730
Wald Test	1768.88	1763.19	1588.86	2786.47	2866.74	2726.55
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Uncensored Obs	72140	72140	72140	51394	51394	51394

Notes: Z-statistics calculated with robust standard errors clustered at the state-level in parenthesis. All estimates include occupation, year and state dummies. Total sample size is 600618.

Table 3.8: Heckman Maximum Likelihood Estimates of the Effect of Prohibition on Log Toddy, IMFL, and Beer Quantity

	Toddy		IMFL		Beer	
	(1)	(2)	(3)	(4)	(5)	(6)
Participation						
Complete Prohibition	0.174	0.071	-0.328	-0.269	-0.380	-0.448
	(5.230)	(1.970)	(6.410)	(5.180)	(3.910)	(4.290)
Partial Prohibition		-0.216		0.131		-0.147
		(7.510)		(4.330)		(2.790)
Log P. C. Expenditure	0.120	0.123	0.757	0.757	0.613	0.613
	(9.430)	(9.660)	(62.220)	(62.170)	(29.470)	(29.510)
Consumption						
Complete Prohibition	-0.009	0.062	0.243	0.159	-0.119	0.016
	(0.120)	(0.790)	(2.320)	(1.450)	(0.560)	(0.070)
Partial Prohibition		0.138		-0.170		0.346
		(2.580)		(2.680)		(2.700)
Log P. C. Expenditure	0.600	0.597	0.491	0.491	0.543	0.542
	(21.150)	(21.010)	(10.860)	(10.600)	(7.880)	(7.980)
Log Likelihood	-73522	-73429	-39748	-39731	-14165	-14156
Inverse Mills	-0.062	-0.056	-0.038	-0.038	-0.090	-0.099
Wald Test	1.15	0.97	0.48	0.42	1.75	2.21
	(0.283)	(0.325)	(0.490)	(0.515)	(0.186)	(0.137)
Uncensored Obs	15081	15081	6661	6661	2011	2011

Notes: Z-statistics calculated with robust standard errors clustered at the state-level in parenthesis. All estimates include occupation, year and state dummies. Total sample size is 600618.

Table 3.9: Heckman Maximum Likelihood Estimates of Incidence of Prohibition by Household Characteristics

	Part A: Participation in Total Alcohol			
	(1)	(2)	(3)	(4)
Complete Prohibition	-0.539	-0.182	-0.353	-0.271
	(16.880)	(6.940)	(13.600)	(11.100)
Partial Prohibition	-0.324	-0.226	-0.217	-0.261
	(14.920)	(10.730)	(11.310)	(13.710)
Complete Prohibition	0.389			
*Rural Dummy	(11.790)			
Partial Prohibition	0.089			
*Rural Dummy	(4.240)			
Complete Prohibition		-0.250		
*Literacy Dummy		(9.920)		
Partial Prohibition		-0.084		
*Literacy Dummy		(4.900)		
Complete Prohibition			0.230	
*SC/ST Dummy			(8.000)	
Partial Prohibition			-0.195	
*SC/ST Dummy			(9.740)	
Complete Prohibition				0.238
*Female Head				(5.260)
Partial Prohibition				-0.019
*Female Head				(0.590)

Notes: Z-statistics calculated with robust standard errors clustered at the state-level in parenthesis. All estimates include occupation, year and state dummies. Total sample size is 600618.

Table continues on next page

Table 3.9: Heckman Maximum Likelihood Estimates of Incidence of Prohibition by Household Characteristics

	Part B: Consumption of Total Alcohol			
	(1)	(2)	(3)	(4)
Complete Prohibition	-0.204	-0.096	-0.242	-0.107
	(3.910)	(2.640)	(6.350)	(3.030)
Partial Prohibition	-0.122	-0.079	-0.057	-0.070
	(4.170)	(3.180)	(2.380)	(3.030)
Complete Prohibition	0.123			
*Rural Dummy	(2.290)			
Partial Prohibition	0.069			
*Rural Dummy	(2.430)			
Complete Prohibition		-0.046		
*Literacy Dummy		(1.030)		
Partial Prohibition		0.039		
*Literacy Dummy		(1.590)		
Complete Prohibition			0.271	
*SC/ST Dummy			(6.550)	
Partial Prohibition			-0.073	
*SC/ST Dummy			(2.740)	
Complete Prohibition				-0.089
*Female Head				(1.130)
Partial Prohibition				-0.056
*Female Head				(0.990)
Uncensored Obs	72473	72473	72473	72473

Notes: Z-statistics calculated with robust standard errors clustered at the state-level in parenthesis. All estimates include occupation, year and state dummies. Total sample size is 600618.

Table 3.10: OLS Estimates of the Effect of Prohibition on Log Unit Values of Alcohol and Arrack

	Alcohol			Arrack		
	(1)	(2)	(3)	(4)	(5)	(6)
Complete Prohibition	-0.354	-0.298		-0.132	-0.056	
	(12.153)	(9.317)		(3.831)	(1.454)	
Partial Prohibition		0.137			0.226	
		(4.499)			(6.236)	
Arrack Prohibition			-0.013			0.127
			(0.483)			(3.969)
Log P.C. Expenditure	0.344	0.342	0.348	0.135	0.133	0.135
	(28.681)	(28.496)	(28.886)	(9.663)	(9.508)	(9.675)
Log Household Size	-0.216	-0.214	-0.218	-0.060	-0.058	-0.060
	(19.341)	(19.222)	(19.514)	(4.665)	(4.538)	(4.686)
Sex of Head	-0.012	-0.012	-0.013	-0.038	-0.035	-0.035
	(0.494)	(0.491)	(0.535)	(1.307)	(1.203)	(1.222)
Age of Head	0.001	0.001	0.001	-0.001	-0.001	-0.001
	(0.729)	(0.756)	(0.702)	(0.834)	(0.801)	(0.860)
Education of Head	0.044	0.045	0.044	-0.003	-0.003	-0.003
	(15.378)	(15.518)	(15.330)	(1.001)	(0.854)	(0.954)
Marital Status of Head	-0.002	-0.003	-0.002	-0.001	-0.002	-0.001
	(0.170)	(0.214)	(0.173)	(0.015)	(0.104)	(0.088)
Land Ownership	-0.096	-0.095	-0.095	-0.097	-0.096	-0.097
	(8.417)	(8.345)	(8.321)	(7.569)	(7.477)	(7.520)
Scheduled Caste/Tribe	-0.069	-0.070	-0.068	-0.098	-0.099	-0.098
	(6.248)	(6.283)	(6.100)	(7.770)	(7.898)	(7.856)
Rural Dummy	-0.226	-0.226	-0.228	-0.062	-0.063	-0.063
	(14.414)	(14.409)	(14.461)	(3.582)	(3.624)	(3.622)
Uncensored Obs	71792	71792	71792	51153	51153	51153

Notes: Z-statistics calculated with robust standard errors clustered at the state-village level in parenthesis. All estimates include occupation, year and state dummies. Total sample size is 600618.

Table 3.11: OLS Estimates of the Effect of Prohibition on Log Unit Values of Toddy, IMFL, and Beer

	Toddy		IMFL		Beer	
	(1)	(2)	(3)	(4)	(5)	(6)
Complete Prohibition	-0.056	-0.097	0.100	0.187	0.347	0.319
	(1.476)	(2.336)	(1.876)	(3.016)	(3.347)	(2.941)
Partial Prohibition		-0.090		0.135		-0.054
		(2.513)		(2.953)		(0.773)
Log P.C. Expenditure	0.105	0.107	0.194	0.194	0.062	0.061
	(6.393)	(6.526)	(7.938)	(7.958)	(1.455)	(1.443)
Log Household Size	-0.103	-0.104	-0.089	-0.088	0.008	0.007
	(6.652)	(6.724)	(3.375)	(3.360)	(0.188)	(0.178)
Sex of Head	-0.006	-0.006	0.132	0.128	0.170	0.170
	(0.189)	(0.185)	(2.055)	(1.986)	(1.944)	(1.947)
Age of Head	-0.001	-0.001	-0.003	-0.003	-0.001	-0.001
	(0.088)	(0.118)	(3.108)	(3.103)	(0.558)	(0.516)
Education of Head	0.024	0.024	0.001	0.003	0.040	0.040
	(5.873)	(5.801)	(0.227)	(0.446)	(3.673)	(3.670)
Marital Status of Head	-0.005	-0.003	-0.005	-0.006	-0.044	-0.043
	(0.237)	(0.174)	(0.091)	(0.123)	(0.711)	(0.708)
Land Ownership	-0.081	-0.082	0.003	0.005	0.069	0.068
	(5.804)	(5.837)	(0.121)	(0.200)	(1.437)	(1.415)
Scheduled Caste/Tribe	0.018	0.018	-0.099	-0.100	-0.171	-0.171
	(1.295)	(1.339)	(2.982)	(2.998)	(3.013)	(3.021)
Rural Dummy	-0.137	-0.137	-0.031	-0.030	-0.202	-0.203
	(6.727)	(6.733)	(1.039)	(0.999)	(3.760)	(3.766)
Uncensored Obs	15018	15018	6548	6548	2000	2000

Notes: Z-statistics calculated with robust standard errors clustered at the state-village level in parenthesis. All estimates include occupation, year and state dummies. Total sample size is 600618.

Table 3.12: Heckman Maximum Likelihood Estimates of Log Addictive Good Budget Shares

	Part A: Participation				
	Total Tobacco	**Bidis**	**Leaf Tobacco**	**Cigarettes**	**Pan**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Log P.C. Expenditure	0.058	0.012	-0.110	0.603	0.227
	(12.090)	(2.390)	(17.290)	(90.810)	(41.820)
Log Household Size	0.208	0.227	0.061	0.432	0.303
	(50.620)	(52.840)	(12.160)	(69.220)	(67.600)
Sex of Head	-1.035	-1.020	-0.408	-0.327	-0.089
	(119.490)	(102.580)	(37.720)	(22.990)	(10.340)
Age of Head	0.002	-0.003	0.008	-0.002	0.005
	(12.290)	(18.620)	(41.830)	(10.200)	(32.710)
Education of Head	-0.134	-0.134	-0.056	0.053	-0.013
	(111.170)	(106.940)	(37.220)	(29.220)	(9.980)
Marital Status of Head	0.083	0.069	0.035	0.040	0.011
	(13.600)	(11.240)	(4.930)	(4.250)	(1.820)
Land Ownership	0.025	-0.062	0.127	-0.031	0.067
	(4.970)	(11.720)	(19.200)	(4.170)	(11.940)
Scheduled Caste/Tribe	0.257	0.125	0.215	-0.026	0.019
	(47.920)	(23.070)	(32.750)	(3.080)	(3.130)
Rural Dummy	0.230	0.217	0.238	-0.101	0.087
	(38.000)	(32.920)	(26.440)	(11.810)	(11.920)

Notes: Z-statistics calculated with robust standard errors clustered at the state-level in parenthesis. All estimates include occupation, year and state dummies. Total sample size is 600618.

Table continues on next page.

Table 3.12 Cont: Heckman Maximum Likelihood Estimates of Log Addictive Good Budget Shares

	Part B: Consumption				
	Total Tobacco	**Bidis**	**Leaf Tobacco**	**Cigarettes**	**Pan**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Log P.C. Expenditure	-0.407	-0.653	-0.670	-0.256	-0.284
	(87.040)	(124.730)	(94.570)	(14.700)	(32.530)
Log Household Size	-0.510	-0.668	-0.716	-0.537	-0.396
	(141.720)	(158.440)	(138.730)	(36.900)	(56.540)
Sex of Head	-0.392	-0.108	-0.141	0.110	0.205
	(40.970)	(8.990)	(11.560)	(3.640)	(14.780)
Age of Head	-0.002	0.001	0.001	0.005	0.003
	(12.450)	(2.490)	(4.310)	(9.720)	(11.580)
Education of Head	-0.023	-0.024	-0.025	0.068	0.021
	(20.380)	(19.110)	(15.260)	(19.490)	(10.430)
Marital Status of Head	0.018	0.011	0.011	-0.011	-0.056
	(3.300)	(1.740)	(1.580)	(0.600)	(5.520)
Land Ownership	-0.079	-0.051	0.002	-0.040	-0.123
	(17.240)	(10.100)	(0.270)	(3.080)	(13.460)
Scheduled Caste/Tribe	0.029	-0.019	0.032	-0.111	-0.228
	(6.700)	(4.040)	(4.920)	(6.930)	(24.200)
Rural Dummy	-0.059	0.008	-0.007	-0.215	-0.116
	(9.800)	(1.190)	(0.680)	(14.490)	(10.320)
Log Likelihood	-821906	-573634	-376444	-199078	-640626
Inverse Mills	0.042	0.033	0.007	0.012	0.029
Wald Test	191.17	45.20	0.97	0.23	85.79
	(0.000)	(0.000)	(0.324)	(0.635)	(0.000)
Uncensored Obs	366299	212854	118520	45114	193912

Notes: Z-statistics calculated with robust standard errors clustered at the state-level in parenthesis. All estimates include occupation, year and state dummies. Total sample size is 600618.

Table 3.13: Instrument Variables Probit Estimates of Addictive Goods Participation

	Participation				
	Total Tobacco	**Bidis**	**Leaf Tobacco**	**Cigarettes**	**Pan**
Household Consumes Alcohol	0.504 (16.206)	0.172 (2.760)	0.959 (19.721)	-0.038 (2.551)	0.857 (18.068)
Household Consumes Arrack	0.464 (16.071)	0.150 (2.372)	0.939 (20.346)	-0.037 (2.503)	0.824 (18.762)
Household Consumes Toddy	0.463 (15.910)	0.681 (5.811)	0.933 (17.519)	-0.031 (0.796)	0.820 (17.065)
Household Consumes IMFL	-0.714 (10.369)	-0.363 (6.731)	-0.254 (11.418)	-0.048 (1.921)	-0.403 (11.297)
Household Consumes Beer	0.390 (2.251)	-0.347 (2.544)	0.903 (4.041)	-0.056 (2.956)	0.755 (3.571)

Notes: Marginal effects reported. Z -statistics in parenthesis. Instruments for toddy, IMFL, and beer are complete prohibition and partial prohibition dummies. Instrument for arrack is arrack prohibition dummy. All regressions include the full set of explanatory variables and occupation, state and year dummies.

Table 3.14: Heckman Maximum Likelihood Estimates of the Effect of Prohibition on Log Addictive Goods Budget Share

	Participation			
	Total Tobacco		Pan	
	(1)	(2)	(3)	(4)
Complete Prohibition	0.020	-0.038	-0.041	-0.116
	(1.380)	(2.430)	(2.090)	(5.680)
Partial Prohibition		-0.177		-0.283
		(14.610)		(17.620)
Log P. C. Expenditure	0.059	0.060	0.227	0.229
	(12.110)	(12.320)	(41.780)	(42.140)
	Consumption			
Complete Prohibition	0.011	0.032	0.008	0.033
	(0.670)	(2.040)	(0.220)	(0.860)
Partial Prohibition		0.092		0.160
		(7.860)		(6.850)
Log P. C. Expenditure	-0.407	-0.408	-0.284	-0.286
	(87.050)	(87.210)	(32.530)	(32.710)
Log Likelihood	-821904	-821668	-640620	-640185
Inverse Mills	0.042	0.040	0.030	0.028
Wald Test	191.50	176.12	87.28	84.21
	(0.000)	(0.000)	(0.000)	(0.000)
Uncensored Obs	366299	366299	193912	193912

Notes: Z-statistics calculated with robust standard errors clustered at the state-level in parenthesis. All estimates include occupation, year and state dummies. Total sample size is 600618.

Table 3.15: Heckman Maximum Likelihood Estimates of the Effect of Prohibition on Log Tobacco Goods Budget Share

	Bidis		Leaf Tobacco		Cigarettes	
	Participation					
	(1)	(2)	(3)	(4)	(5)	(6)
Complete Prohibition	0.086	0.069	-0.178	-0.261	0.069	0.076
	(5.150)	(3.980)	(6.860)	(9.710)	(3.590)	(3.840)
Partial Prohibition		0.061		-0.340		0.018
		(4.400)		(17.560)		(1.230)
Log P. C. Expenditure	0.013	0.013	-0.110	-0.109	0.603	0.603
	(2.470)	(2.540)	(17.400)	(17.160)	(90.860)	(90.830)
	Consumption					
Complete Prohibition	-0.004	0.001	0.100	0.131	-0.018	0.040
	(0.200)	(0.010)	(3.330)	(4.290)	(0.520)	(1.090)
Partial Prohibition		0.017		0.205		0.138
		(1.270)		(9.270)		(5.640)
Log P. C. Expenditure	-0.653	-0.653	-0.670	-0.670	-0.256	-0.254
	(124.770)	(124.790)	(94.560)	(94.580)	(14.780)	(15.040)
Log Likelihood	-573608	-573587	-376362	-375863	-199070	-199048
Inverse Mills	0.033	0.034	0.007	0.002	0.013	0.017
Wald Test	45.44	46.36	0.98	0.05	0.30	0.55
	(0.000)	(0.000)	(0.322)	(0.820)	0.5870	(0.457)
Uncensored Obs	212854	212854	118520	118520	45114	45114

Notes: Z-statistics calculated with robust standard errors clustered at the state-level in parenthesis. All estimates include the full-set of explanatory variables and occupation, year and state dummies. Total sample size is 600618.

Chapter 4

Alcohol Prohibition and the Negative Effects of Alcohol Use

4.1 Introduction

The negative effects of alcohol use have been a key argument of anti-liquor movements for the prohibition of alcohol. Temperance groups since the 19th century have claimed that alcohol availability promotes immorality, domestic violence, and criminal behaviour, in addition to increasing the rate of alcohol-related disease and death (Thornton (1991)). In the case of India, the Constitution emphasizes the need for state prohibition of alcohol as a precursor for alleviating hunger and poverty[1]. This underlies the arguments of many prohibitionists, particularly in low-income countries, that alcohol consumption diverts scarce resources from more essential expenditures such as food, fuel, health care and education[2]. This chapter examines the effect of alcohol prohibition in India on the intrahousehold allocation of resources and indicators of negative private and social effects of alcohol use. In doing so, it goes some way to test prohibitionist's claims regarding the relative benefits of

[1] See Chapter 2, Section 2.2.1.

[2] Women's movements have argued that alcohol prohibition alone is not sufficient to stop 'wastage' of household resources and have also advocated bans on single number games, drugs, and matka (a form of gambling) - vices which poorer households are assumed to be highly vulnerable to. On this basis alone, it is not obvious why alcohol should be the only candidate for prohibition as one could equally argue that expenditure on other "non-essentials" such as entertainment or make-up should also be constrained.

alcohol prohibition[3].

That alcohol use is related to a wide variety of physical, mental, and social harms has been widely documented[4]. Private effects, which are suffered directly by the consumer, include higher rates of alcohol-related illnesses, deaths from liver failure, cancer, and poisoning, and mental and social problems associated with alcoholism. Social negative externalities associated with alcohol use are higher rates of fatalities and injuries due to drink-driving and industrial accidents, higher crimes rates, and increased incidence of domestic violence and aggravated assault. In addition to these, there are effects borne by the drinker's family which cannot be easily categorised as private or social effects as they incorporate elements of both. They include mental harm induced by living with alcoholics and negative effects of constraints on consumption due to a large part of the family's income being spent on alcohol. The consequences of this can be particularly acute in developing countries where the budget constraint is often binding at unsustainable levels of consumption for human well-being.

There has been limited econometric work on the effects of alcohol consumption and policy on negative private and social harm, in the context of India's experience with alcohol. The main studies which exist are specialised, small-scale analyses focused on specific local areas[5]. As with the literature in developed countries, alcohol use is associated with greater incidence of crime, violence against women, and aggravated assault. This chapter builds on this literature by undertaking an econometric analysis of the effects of prohibition on the negative consequences of alcohol use. The analysis first examines detailed household level information on the intrahousehold allocation of resources to ascertain whether prohibition resulted in an increase in the consumption of all other goods, and if so which particular groups of items. In particular, it further explores the issue of underreporting and whether the effects of prohibition on the household consumption bundle are consistent with systematic underreporting and the changes in alcohol price due to prohibition. The

[3]The analysis does not attempt to prove that prohibition results in an increase in social welfare. Rather it provides empirical evidence to examine the prohibitionists' claims regarding prohibition policy.

[4]See WHO (2001) for a detailed survey of the medical research on alcohol consumption and private harm; Cook and Moore (1999) for an overview of the econometric literature of negative effects associated with alcohol; Miczek et al (1994) for a review of the link between alcohol and violence.

[5]See for example, AIIMS (1978).

basic presumption here is that if prohibition actually decreased alcohol consumption then one can predict from the basic theory of the consumer, that there should be changes in the budget share of all other items taken as a composite and at least one subgroup within it.

The results indicate that complete and partial prohibition lead to a significant increase in food and fuel budget shares, in particular the consumption of pulses, fruits and vegetables, and dairy products. It also increased outlays on amusement services but decreased expenditures on educational items, household appliances, and toiletries. The reallocation of resources favoured child food items such as baby food and milk, but did not follow specific sex lines. The nature of these findings indicate strong support that the estimated reduction in alcohol demand is not solely due to underreporting which increases our confidence in the results from Chapter 3. The analysis also suggests that households which experienced the greatest fall in alcohol consumption were also those who experienced the greatest reallocation of expenditures. This is observed most acutely for households with a large proportion of adult males who tend to have significantly higher levels of alcohol participation and expenditures. The implication is that the direction of causation is from prohibition to household outlays and not vice versa.

The chapter then focuses on the private and social negative effects of alcohol by examining state-level time series data for the sixteen major Indian states over 1957-2001[6]. Indicators of private harm studied include treatment rates of liver-diseases and rates of alcohol-related deaths including deaths from liver-disease, liver cirrhosis, spurious liquor, poisoning, and general accidents. Social externalities examined include road accident fatalities and crime rates by type of crime including murder, rape, burglary, robbery, theft and dacoity.

The analysis finds that prohibition is associated with a significant increase in liver disease deaths but a significant decrease in spurious liquor and liver cirrhosis deaths. The divergence in the effect on health indicators may be due to differences in time frame or differences in the channels through which prohibition affects these diseases. With regards to social effects, prohibition was found not to have any impact on road accident fatalities, perhaps due to the low rate of motor vehicle usage. Prohibition reduced total crime by reducing the number of

[6]This data is as used in Chapter 2.

burglaries. There is also some evidence of a decline in the number of rapes which together with results on expenditures on female clothing, suggest that prohibition may have improved female mobility. In spite of these positive trends in crime rates, prohibition policy is also associated with a significant increase in the homicide rate. This is most likely due to an increase in organised crime and illegal activity associated with black markets in alcohol.

The chapter proceeds as follows: Section 4.2 discusses the arguments for prohibition with regards to the negative effects of alcohol use. The analysis then focuses on assessing the impact of prohibition on intrahousehold allocation of resources. To this end, Section 4.3 outlines a framework for analysing the effect of prohibition on consumption of other household items given the estimated change in alcohol consumption and unit values. Section 4.4 discusses the empirical specification and data and highlights possible problems with the approach. Results of changes in broad consumption goods are discussed in Section 4.5 which is followed by an analysis of the effects of alcohol prohibition by household characteristic in Section 4.6. Section 4.7 analyses the impact of prohibition on private and social negative effects of alcohol use. The main findings of the chapter are analysed in Section 4.8 which concludes.

4.2 Background

The traditional argument for prohibition versus other policy tools with regards to the negative effects of alcohol use are based on three main factors: the preferences for eliminating alcohol consumption, the relative efficacy of prohibition policy, and the positive effects of prohibition.

Prohibition may be the most suitable policy lever if the primary objective of policy is to eliminate alcohol consumption due to moral or religious considerations, or if preferences for paternalism are extremely high. These tendencies may also arise if the negative externalities associated with alcohol consumption are large in scale, regarded as more detrimental, or harder to contain. This may be a primary reason as to why alcohol is subject to greater calls for prohibition relative to other addictive goods such as cigarettes[7]. The main externalities

[7] Cigarette use is also associated with significant private harm although the negative social effects, aside

associated with excessive alcohol use are motor vehicle accidents and first-degree crimes such as murder, assault and rape, which tend to be regarded as significant negative effects.

The second set of arguments for prohibition focus on the relative efficacy of prohibition in reducing alcohol consumption. The traditional method for curtailing alcohol consumption, in part to reduce the negative effects of alcohol use, is taxation combined with age restrictions and regulations on licensing hours. The argument for prohibition versus other policy levels is therefore not clear cut, particularly as there is substantial evidence linking alcohol taxation and price with the negative private and social effects of alcohol[8]. Prohibition may be a more suitable instrument for controlling alcohol consumption when demand is inelastic or when tax systems are under-developed such that higher taxes do not translate into higher effective prices.

As discussed previously, the econometric evidence on the elasticity of alcohol demand in India is mixed with some studies finding elastic, and others inelastic, consumption functions. The qualitative evidence[9] suggests that aside from a minority of users, alcohol consumption tends to be concentrated among heavy users suggesting an inelastic demand function. Furthermore, it is associated with a culture of intoxication, the implication being that the adverse effects of consumption are accentuated resulting in a higher incidence of drunkenness. In this instance, prohibition may be more effective in controlling consumption relative to taxation or other direct price measures.

While these arguments for prohibition versus taxation are attractive on theoretical grounds, it is not clear whether prohibition has the desired effect on the negative consequences of alcohol use. The analyses in Chapter 3 and the available literature on the effects of alcohol prohibition in the US suggests that prohibition results in a significant reduction in participation in alcohol consumption[10]. The expected fall in the negative effects of alcohol use is corroborated partly for alcohol-related diseases by Miron (1991) who finds that US prohibition significantly decreased rates of liver cirrhosis and alcoholism, in line with the estimated mean fall in consumption. However, the qualitative literature for

from health-effects of secondary smoke, can be argued to be lower than for alcohol.

[8] See for example, Chaloupka et al (1993); Dave and Kaestner (2001); Grossman and Markowitz (1999); and Markowitz (1999, 2000a).

[9] See for example, AIIMS (1978) and Government of Maharashtra (1986).

[10] See Warburton (1932) and Thornton (1991) for literature on the impact of the US Prohibition of Alcohol.

the US also documents an increase in alcohol consumption amongst certain groups due to the glamorization of illicit drinking and the culture of speakeasies. In addition, in India, alcohol consumption and participation did not fall to zero during prohibition periods. This indicates that although consumption declined at the mean, for the alcohol consuming population there was a higher probability of consuming spurious liquor together with its higher associated health risk. Prohibition may therefore, result in an increase the incidence of alcohol-related death and disease.

Proponents of prohibition have argued that, aside from its direct effects on alcohol consumption, prohibition is also associated with several positive effects. Specifically, prohibition reduces the 'wastage' of resources and redirects limited resources to more productive uses. This may shift the power balance within the household by enabling women to have greater say in the allocation of household resources. Women generally tend to have less bargaining power in Indian households, and given the substantial evidence against the unitary model of household decision-making[11], this would be a positive end in itself. Furthermore, as greater resources controlled by women have been found to be related to higher expenditures on child-related items, this may have a positive impact on child welfare.

Prohibitionists have also claimed that prohibition policy reduces crime by lowering the incidence of alcohol-related criminal behaviour such as violent assault and rape. In addition, the policy is assumed to limit the power of the local mafia by curtailing the income of liquor barons, who are linked with the criminal underworld and organised crime. Aside from the effect on crime, prohibition is claimed to improve labour productivity and reduce the extent of absenteeism, thereby increasing output and growth.

Given that these purported benefits of prohibition are mainly a function of the policy's ability to reduce alcohol consumption, they could theoretically be achieved using alternative policy levers. The argument of these associated positive effects are therefore not sufficient grounds for prohibition policy. Counter to the claim of temperance groups, prohibition itself may be associated with particular negative effects that are not a feature of other policies such as taxation. Specifically, prohibition may increase overall crime rates by raising the price of alcohol for users and encouraging the growth of criminal activity by alcohol

[11] See Doss (1994) for a survey of the empirical literature.

suppliers. By creating a regulatory vacuum and incentives for the creation of black markets, prohibition may induce economic agents to use criminal methods to enforce contracts where state intervention is restricted. Furthermore, illicit methods are more likely to be used to retain and expand market shares of illegal sales. There is also the risk of organised criminal activity strengthening as they expand to control alcohol black markets[12]. This is supported by the available empirical research for the US which finds that prohibition resulted in a significant increase in the aggravated assault and the homicide rate, with much of this associated with organised crime and gang warfare (Warburton (1932); Thornton (1991); Miron (1999a)).

The evidence for prohibition reducing the incidence of industrial absenteeism and increasing productivity is also limited. Some studies (Bureau of Prohibition (1930)) claim that prohibition resulted in a decrease in absenteeism and lowered the incidence of "Blue Monday", while others (Warburton (1932)) find no effects on industrial productivity, absenteeism, or the rate of industrial accidents.

Taken together, the arguments for alcohol prohibition, with respect to alternative policy tools and the negative effects of alcohol consumption, are not clear cut. The main aim of the analysis in this chapter is to contribute to this debate by estimating the effect of prohibition on intrahousehold allocations, and on selected indicators of private and social harm. In doing so, it provides an empirical basis for assessing the validity of prohibitionists' claims regarding the effects of prohibition policy.

4.3 Basic Model

Prohibitionists, particularly in low-income countries, have long claimed that alcohol consumption diverts scarce resources from otherwise useful expenditures. Central to this argument is that alcohol is consumed mainly by men who are the primary breadwinners and have a greater say in the intrahousehold allocation of resources. For households whose consumption levels are already constrained, as in the case in much of India, such "wasteful"

[12]The growth of organised crime associated with bootlegging in the 1920s in the US has been attributed to this. In fact, Al Capone originally was involved in gambling and vice and then expanded into bootlegging during Prohibition.

expenditures can have severe and permanent effects on the well-being of household members. In particular, it is argued that women and children bare the true economic cost of alcohol use as limited household resources are reallocated from them. Even in the absence of direct discrimination, if the primary bread winner spends a large portion of their daily wage on alcohol before coming home, they limit the availability of funds for other items[13].

This section examines whether prohibition affects the intrahousehold allocation of resources by examining its impact on demand for other items in the household consumption bundle. In particular it focuses on the direction of change, if any, and which types of goods are particularly affected. While this does not allow inferences regarding changes in the level of household welfare, it does offer suggestive evidence to test the claim of prohibitionists that prohibition leads to an increase in expenditures on household essentials.

The analysis proceeds by assuming the household maximizes a weakly separable utility function subject to a standard budget constraint:

$$Max_{x_1,...,x_n}\ U(x_1, x_2, ..., x_n) \qquad s.t. \qquad \sum_{i=1}^{n} p_i x_i = M - c = I \tag{4.1}$$

$$x_i \geq 0 \qquad i = 1, 2, ..., n$$

$$c \begin{cases} = 0 \\ > 0 \end{cases} \text{ if } \begin{matrix} x_1 = 0 \\ x_1 > 0 \end{matrix}$$

where x_1 is alcohol, $x_2, ..., x_n$ are all other commodities in the household consumption bundle, p_i is the price of good i, M is household income, and c is a fixed cost of consuming alcohol. First-order conditions are:

$$U_i - \lambda p_i = 0 \qquad (i = 1, 2, ..., n) \tag{4.2}$$

[13]This has led to many women's groups lobbying for liquor shops to be closed on payday or for bars to be located a long distance from centre of employment such as local factories or village centres.

$$\sum_{i=1}^{n} p_i x_i^* - I = 0 \tag{4.3}$$

These imply:

$$x_i^* = D_i(p_1, ..., p_n, I) = D_i(p, M, c) \tag{4.4}$$

and

$$\frac{\partial x_i^*}{\partial I} = \frac{\partial D_i}{\partial I} \gtreqless 0 \qquad (i = 2, ..., n) \tag{4.5}$$

$$\frac{\partial x_i^*}{\partial p_1} = \frac{\partial D_i}{\partial p_1} = \frac{\partial H_i}{\partial p_1} - x_1 \frac{\partial D_i}{\partial I} \qquad (i = 2, ..., n) \tag{4.6}$$

where D_i and H_i are the Marshallian and Hicksian demand functions respectively.

Within this framework, the effect of prohibition on consumption can be analysed if we assume that prohibition increases the effective fixed cost of alcohol consumption and affects the alcohol price faced by the household. As discussed in Chapter 3, prohibition may increase the fixed cost of alcohol due to difficulties associated in acquiring liquor, the penalties associated with prohibition, and the imputed costs that arise from a higher probability of drinking spurious liquor. The increase the fixed cost of participating in alcohol consumption, c, should therefore induce households at the margin to drop out of the alcohol market, and induce a pure income effect on demand for all other goods. If the good in question is a normal good, an increase in c will decrease total income and decrease demand. On the other hand, if the good is inferior then demand will increase or remain the at the same level. While a given consumption bundle can contain any mix of inferior and normal goods, the properties of the utility function predicts that at least one good will be normal i.e. the demand for at least one good will decrease when income falls. We should therefore expect the pure income effect of prohibition to decrease consumption of normal goods and increase consumption of inferior goods.

The Slutsky decomposition in Equation 4.6 denotes the substitution and income effects of a change in the price of alcohol on all other goods. If alcohol and the good in question

are Hicksian substitutes, then $\frac{\partial H_i}{\partial p_1} > 0$; if they are Hicksian complements $\frac{\partial H_i}{\partial p_1} < 0$. The overall change in demand will therefore depend on whether the income effect of the price change reinforces or offsets the substitute effect. The results in Chapter 3 indicate that complete prohibition lead to a significant decrease, and partial prohibition a significant increase, in the unit value of total alcohol. If one assumes no differences in the quality of alcohol consumed before and after prohibition periods (admittedly a strong assumption to make given the nature of illicit brewing and that alcohol transported illegally from other states is likely to be produced differently), unit values tend towards the price of alcohol. The substitution effect arising from the decrease in the price of alcohol would therefore decrease the consumption of goods which are Hicksian substitutes and increase the consumption of Hicksian complements. The income effect would increase consumption of normal goods and reduce those of inferior goods. The overall effect on demand due to the price change therefore depends on the characteristics of the good in question. The effects of the price increase during partial prohibition will work in the opposite directions.

Overall, the effect of alcohol prohibition on the demand for other items in the households consumption bundle works through two main channels. The higher fixed costs of acquiring alcohol acts as a negative income effect, while the change in price of alcohol due to falls in supply of alcohol and changes in market demand, induce substitution and income effects. The expected direction of demand for non-alcohol items together with the breakdown into the pure income effect and price effect is listed in Box 1. Given that all other items in the household budget (aside from other addictive goods) are likely to be substitutes for alcohol, the substitution effect of the price change is given only for Hicksian substitutes. As can be inferred from the Box, the effect of prohibition on the demand for other goods is ambiguous, aside for inferior goods during partial prohibition, and a matter for empirical estimation which is what we turn to next.

Box 1: Effect of Prohibition on Demand for Household Goods

	Complete Prohibition		Partial Prohibition	
Type of Good	Normal	Inferior	Normal	Inferior
Change in alcohol price	Decrease	Decrease	Increase	Increase
Pure Income Effect	Negative	Positive	Negative	Positive
Price Effect	Ambiguous	Negative	Ambiguous	Positive
Substitution Effect	Negative	Negative	Positive	Positive
Income Effect	Positive	Negative	Negative	Positive
Overall Effect	**Ambiguous**	**Ambiguous**	**Ambiguous**	**Positive**

Notes: Alcohol price is proxied by alcohol unit values

4.4 Estimation and Data

4.4.1 Econometric Specification

The econometric strategy is to estimate Engel curves of the following form for disaggregated household expenditure items:

$$w_{ist} = \alpha + \beta \ln X_{ist} + \psi \ln X_{ist}^2 + \gamma \ln N_{ist} + \lambda Z_{ist} + \zeta R_{ist} + \mu P_{st} + \phi O_{st} + \rho_s + \delta_t + \varepsilon_{ist} \tag{4.7}$$

w is the budget share of expenditure items in the household consumption bundle for household i in state s and year t, X is per capita real monthly household expenditure, N is household size, Z is a vector of household characteristics, R is a dummy for the rural sector, P and O are complete and partial prohibition policy variables as described in Chapter 3, ρ and δ are state and year dummies, and ε is the error term. Household characteristics included are household caste (scheduled caste/tribe or general caste) and the sex, literacy, land ownership, age, marital status and occupation of the household head. Controls for household composition were also included in the following disaggregated age groups for

both sexes: less than two years, two to four years, five to nine years, ten to fourteen years, fifteen to nineteen years, twenty to twenty nine years, thirty to fifty four years, and fifty five years and above. The state effects control for state-specific variables which may affect consumption patterns, such as a high preference for specific types of goods, and which if not controlled for may result in serial correlation in the error terms. The year effects control for year-specific shocks at the All-India level which may affect household budget shares[14].

The inclusion of the squared per capita expenditure term requires further discussion, particularly as the literature on food Engel curves has found food shares to be linear with respect to expenditure in countries such as the US and UK[15]. However, for poorer countries, where consumption is constrained at low levels of food intake, there is evidence of a non-linear relationship. Specifically, Bhalotra and Attfield (1998) find that household food Engel curves are quadratic logarithmic in rural Pakistan. In addition, Deaton (1997) reports non-parametric estimates of Indian food budgetshares which are nonlinear with respect to expenditure. The assumption of a non-linear relationship is therefore carried over to the present analysis given that India is a low-income country and exhibits similar patterns in household consumption given the cultural similarity to Pakistan. The quadratic logarithmic form is relevant given Bhalotra and Attfield's finding that the parametric quadratic model is a good approximation to the true functional form as estimated using semi-parametric methods.

4.4.2 Dataset

The dataset used is compiled from thirteen cross sections of the National Sample Survey between 1983-2000 which covers over 60 broad item groups and within them, over 800 narrowly defined categories. The analysis in this chapter focuses on the following aggregate item groupings - total food expenditures and sub-categories including grains and cereals, pulses, meat and fish, fruits and vegetables, and dairy products; fuel, clothing and footwear, amusement services, educational goods and services, health goods and services, toiletries, general consumer services, and miscellaneous goods; and durable goods such as furniture,

[14] State-specific, year trends were also included in the specification as a robustness check of the results. The main results were found to hold and hence these estimates are not reported.

[15] See for example, Banks et al (1997) and Lewbel (1991).

recreational goods, and household utensils and appliances. As with the data in Chapter 3, all expenditures are recorded at the household level and based on 30-day recall. In order to ensure comparability of goods classifications over time, some categories are not included in all years as there are occasional changes in definition of items or coverage of the survey period (annual versus monthly). Details of these, and the actual items included in each group, are given in the Data Appendix for this Chapter.

4.4.3 Estimation Issues

Equation 4.7 was estimated using ordinary least squares (OLS) with Huber-White standard errors clustered at the state level. This estimator was used as opposed to a GLS estimator with a state-specific error structure as used in Chapter 2, as its asymptotic properties are better suited for cross-sectional time series data where the number of periods is small. In addition, the OLS estimator is consistent, although not necessarily the most efficient[16].

There are several estimation issues which arise in estimating Equation 4.7. One set of issues concern the limitations of household Engel curves to infer the welfare of individuals within the household and to make welfare comparisons across households[17]. While households are the primary unit of observation particularly for consumption and expenditure decisions, the intrahousehold allocation of resources across individual members is an important determinant of individual welfare. If women or children are systematically discriminated against in receiving household resources, then a mean estimate of household welfare overstates their true well-being. This feature of intrahousehold allocation of resources is not accounted for in the Engel curve approach which treats each individual equally with respect to per capita expenditure and the distribution of household welfare.

Even if welfare is equally distributed across individuals within a household, it is not clear that per capita consumption measures provide an accurate ranking of welfare across different households or of the members within them. The equivalence scale literature emphasizes that per capita expenditure measures may not be accurate estimators of welfare as household members often require different types and levels of consumption to attain a

[16]The Heckman estimator was not used in this case as there was no censoring for most of the consumption items examined.

[17]See Deaton (1997) for a detailed discussion of the main issues.

given level of welfare. For example, children require less than adults, while the elderly may require specific items, such as health care versus food, to attain the same level of welfare as prime-age adults. The presence of economies of scale in consumption further complicates inter-household comparisons. Economics of scale may arise due to the presence of household public goods or if household members have interdependent utility functions. Ignoring household composition and assuming that households with similar total expenditures and household sizes are comparable therefore masks importance differences in welfare across households. In particular, it understates the true welfare of larger households relative to smaller households at the same level of per capita expenditure.

Deaton (1997) notes that the obvious solution to the problem of equivalence is a system of weights where individuals are counted in terms of adult equivalents. This approach also allows for economies of scale by converting adult equivalents into "effective" adult equivalents such that households containing four adults could be directly compared with 2 households containing 2 adults each. However, the calculation of adult equivalent scales has been a matter of intense debate, particularly in reference to the nature and source of the weight variables, and there is no consensus in the literature as to the correct approach to take.

The Working-Lesser Engel curves estimated in this chapter allow the examination of household expenditures conditional on total outlay and household structure. While this approach does not fully compensate for the differing needs of individuals to attain a given level of welfare, it goes some way for controlling for household demographic structure. The implication is that households of similar size and composition, whose outlays on a given item are equal are equivalent with respect to welfare. Given the difficulties in using equivalence scales and the lack of consensus in the literature, this approach has been the standard method for analysing household consumption patterns. The impact of prohibition on the household consumption bundle therefore is estimated for the average household assuming welfare is equally distributed across all members. The analysis therefore does not make any inferences regarding the welfare of particular groups within the household, or whether the policy change affects the nature in which household resources get allocated[18].

[18]This may occur, if prohibition gives women greater control of household resources which in turn reflect

An attractive feature of this approach is that it allows examination of difference in household outlays according to the demographic composition of the household. Although household size and composition cannot be assumed to be entirely exogenous, F-tests of equality of the disaggregated age-sex coefficients allows the detection of differential household allocations by gender. While this is a necessary condition for discrimination, it is not sufficient as differences in allocation may arise for other reasons such as preferences or need. However, for certain groups of items, for example education, differential boy-girl spending maybe strongly indicative of discrimination.

Empirically, the impact of prohibition on household expenditure shares is difficult to estimate for several reasons. First, average alcohol budget shares are small (approximately 4% on average) and therefore even a 100 percent decrease would constitute a small change in the budget share of all other items. This is compounded if the extra available expenditure is distributed across consumption groups. The large sample size of the National Sample Survey data increases the degrees of freedom in the econometric analysis which improves the chances of finding any such effect, although the potential problem of insufficient variation remains. The approach taken in this chapter is to examine sufficiently broad groups, such as total food outlays, so that the effects, if any should exist, are more easily detected statistically. However, as aggregation can disguise important shifts within groups, for example due to quality upgrading, the analysis also focused on sub-groups such as grains and cereals, meat and fish, fuel, household utensils, and services. Examining detailed item groups raises the problem of small budget shares which is a characteristic of many essential items such as household toiletries but also of others of particular interest such as education and health. In addition, certain consumption items, for example furniture and household appliances, are lumpy and require large increases in expenditures to increase consumption of one more unit. Given the small budget share of alcohol, the increase in expenditure may not be sufficient to detect any effects of prohibition on the budget shares of these items.

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their preferences more.

4.5 Alcohol Prohibition and Household Consumption

4.5.1 Food and General Goods

Food Items

Expenditure on food items comprises the largest share of the Indian household budget and is approximately 60% of total expenditures for the average household[19]. Of this, the largest proportion of expenditures are on cereals and grains which comprise 25% of total outlay, followed by vegetables and dairy products which are approximately 7% each of the average household budget (Table 4.1). Parametric estimates of food Engel curves are reported in Table 4.2 and confirm patterns found in similar analysis by other researchers (Deaton & Subramaniam (1994); Deaton (1997); Bhalotra and Attfield (1998)). At mean levels of household expenditure, food is an inferior good given that increases in per capita expenditures result in decreases in budget shares. Furthermore, the decline is non-linear as reflected by the negative and significant log per capita expenditure term, which implies that foodshares fall less rapidly for poorer households relative to rich ones.

However, examining aggregates can mask important differences within broad groups. The remaining columns of Table 4.2 disaggregates total food into grains and cereals, pulses, meat and fish, fruits and vegetables, and dairy products. The Engel curve estimates suggest that, aside from grains and cereals, all food groups are normal goods displaying increases in budget shares as expenditure increases. The fall in grain and cereal budget shares as household per capita expenditure increases corroborate Subramaniam and Deaton's (1996) findings of quality-upgrading between food groups. The negative squared per capita expenditure term suggests this occurs at a decreasing rate implying some quality-upgrading within the grains and cereals sub-group also occurs.

For food budget shares as a whole, there are significant economies of scale in consumption as increases in household size reduce budget shares, presumably as larger households have more children. This pattern is mixed for the remaining food items with pulses and fruits and vegetable expenditures exhibiting economies of scale but cereals and grains, meat and

[19] Food budget shares are 64% of total expenditures for the median household.

fish, and dairy products diseconomies of scale. This may be due to composition effects of larger households in that more children result in increases in expenditures of specific items like dairy and high protein foods. There are also important differences by household demographic composition – households with a higher proportion of males, aged 5 and above, tend to have higher budget shares of all food items. The evidence for differences by age-sex for children is weak but suggestive of boy-girl discrimination for children younger than 2 for grains and cereals, meat and fish, and dairy products[20].

Rural households tend to have a lower food budget share relative to urban households, possibly to due to lower prices and/or computation of home grown consumption. Female headed households, older and educated household heads tend to have higher food budget shares, while married heads and schedule castes and tribes have lower food budget shares. These patterns do not extend to all food sub-items which exhibit significant differences according to household characteristics. For example, landed households consume relatively less grains and cereals compared to land-less households as one would expect given their higher per capita expenditures. SC/ST households consume less pulses and more meat and fish relative to general caste households, while households with literate heads allocate more of their budget towards fruits and vegetables and pulses relative to illiterate households. There are also significant differences by occupation with labourers and farmers consuming more grains and cereals as expected given the physical nature of their work and lower income class.

Given the large budget share of food items, one would expect to best detect the effect of prohibition on budget shares for this group. Table 4.3 shows that prohibition had significant positive effects on aggregate food budget shares although its effects differed significantly across food groups. Complete prohibition periods saw an increase in food budget shares of 0.5 percentage points on average but had no significant effect on the consumption of grains and cereal, or meat and fish. The insignificant effect on grains and cereals may be due to quality upgrading between and within groups resulting in offsetting effects[21]. The result for

[20] F-tests for the effect of age-sex composition of the household on budget shares were carried out following Deaton (1997). A significant difference at the 5% (strong) or 10% (weak) level was taken as evidence of discrimination. This is bearing in mind the caveat that other factors may be driving the differences such as preferences or need.

[21] It is unlikely to be due to insufficient variation as grains and cereals constitute 26 percent of the household

meat and fish may be due to their relatively high per unit price which may require large decreases in other budget shares for significant increases in demand. Complete prohibition did significantly increase budget shares of fruits and vegetables, pulses, and dairy products which are the main components contributing to the total increase in food outlays.

As food is an inferior good, the increase in fixed costs of consuming alcohol during prohibition induces a pure positive income effect on total food demand. In addition, unit values fell during complete prohibition (Tables 3.10 and 3.11) which imply that the substitution and income effects from the change in alcohol price are negative and reinforce one another (See Box 1). Together, the theory is ambiguous regarding the effect of prohibition on food. The estimated positive effect of prohibition on food budget shares therefore suggests the positive pure income effect dominated any changes induced by the price effect.

Partial prohibition also had a significant and positive affect on food budget shares, which increased by 1.4 percentage points. The overall positive effect of partial prohibition is as predicted by theory; given the rise in alcohol prices during partial prohibition, the substitution and income effects are positive and reinforce the positive pure income effect. The increase in food shares is partly due to increases in expenditures on grains and cereals, pulses and dairy products. Similar to complete prohibition, partial prohibition had no effect on meat and fish budget shares and actually reduced fruit and vegetable outlays. Overall, arrack prohibition increased food shares by 1.1 percentage points with the main increases coming from grains and cereals, dairy products and pulses.

General Items

Expenditures on general items constitute approximately 35% of the household budget and range from 8% for fuel to 0.5% for amusement services (See Table 4.1 for summary statistics). Engel curve estimates of general goods demands are given in Table 4.4. Aside from health goods and services, clothing and footwear, toiletries, and amusement services, all general items are inferior goods with respect to per capita expenditure. In addition, there are strong non-linear effects in all estimations. Outlays on certain goods exhibit economies of scale with respect to household size including consumption of fuel, household toiletries, and

budget on average and effects of prohibition have been found for items with much lower expenditure shares.

consumer services such as maid services.

There are significant differences in resource allocations by household characteristics. It is interesting to note that households with literate heads spend significantly more on educational materials, while rural and SC/ST households spend significantly less. On the other hand, rural and SC/ST households spend significantly more on health goods and services whilst households with female and literate heads spend significantly less. It is difficult to attribute any one reason for the cause of the differences in expenditure patterns, but it is plausible to assume that they are driven by preferences, need or availability of alternate facilities. For example, rural households may spend less on education due to lower rates of schooling, fewer facilities or more free schooling. In addition they may spend more on health due to higher prevalence of disease and lack of access to free health care.

Prohibition had a significant and varied estimated effect on the general goods examined (Table 4.5). This is in spite of their relatively small magnitude which make it difficult to detect any causal changes. Similar to food, fuel budget shares increased during complete prohibition suggesting the pure income effect dominated the effect of alcohol price on demand. Complete prohibition increased budget shares of clothing and footwear, consumer services, and amusement services, which includes visits to the cinema or theatre. However prohibition shifted resources away from expenditures on recreational goods such as musical instruments, household items such as utensils and toiletries, and furniture and fixtures. There was no effect on the budget shares of educational materials such as books, periodicals and newspapers, or on health goods and services[22].

Partial prohibition significantly increase allocation of resources towards fuel, education, health, and furniture and fixtures which is as expected given their inferior good properties. The only exception to this rule is household utensils and appliances whose budget shares actually declined. In addition it decreases budget shares of household toiletries. There were no effects on clothing and footwear, amusement services, or general consumer services.

[22]This is also observed for health goods and health services when analysed separately.

4.5.2 Child Goods

One of the main arguments of the anti-liquor movement for prohibition is that alcohol consumption reallocates resources from productive uses such as expenditure on child-specific goods. While it is difficult to argue that increased expenditure on such items improves household welfare without specifying a particular welfare function and sharing rule, it is interesting to examine whether prohibition results in increases of expenditures for goods which are key inputs for the welfare of specific household members. In doing so, it should be noted that the analysis does not attempt to trace the mechanism by which any such effect would operate, for example through greater bargaining power of women or children, but simply aims to detect the reduced-form nature of the effect of prohibition on intrahousehold resources.

The NSS includes information on three child-specific expenditure items - baby food, milk (liquid, powder and condensed), and expenditure on books, fees and other school-related educational items. The choice of milk requires some discussion as it can be argued that dairy products, in general constitute an important part of the Indian diet so is not correctly specified as a child good. While this is accurate, milk compromises a large portion of children's diets and as such changes in milk budget shares affect children disproportionately relative to adults.

Engel curves for the child-specific items are estimated in Table 4.6. The estimates suggest that all child goods examined are normal goods and are non-linear with respect to per capita expenditure. There are some differences in the budget share of these items by age and sex. In particular, milk consumption is significantly higher in households with boys under the age of 2 relative to similar households with females aged 2 and lower. A similar result is observed for the 5-9 and 10-14 age groups. Expenditure on education goods is also significantly higher for households with older boys between the ages of 5-19. Across all three child goods budget shares increase with higher proportion of adult (child bearing age) females. This suggests that women may have greater preference for child-goods relative to men, a pattern which has also been found in other studies[23].

[23] Hoddinott and Haddad (1995) find that higher female income shares increase household expenditures on child-related goods. Lundberg et al (1997) study the effects of a policy change in the UK transfer payments

The results on the effect of prohibition on child-goods are consistent with the findings for food, dairy products and educational materials as a whole (Table 4.7). The impact of prohibition on budget shares of baby food and milk is positive and significant but small which is expected given their small budget shares. On the other hand, complete and partial prohibition significantly decreased expenditure on child education items such as books and school fees. These effects are consistent with the theoretical predictions which are ambiguous for normal goods for both complete and partial prohibition (Box 1). The results therefore indicate that the income effect due to the price change of alcohol dominated both the substitution effect and the pure income effect[24].

4.5.3 Sex-specific Goods

Given that alcohol is mainly consumed by men and that the anti-liquor movement was spear–headed by women, it is natural to examine the effect of prohibition on sex-specific goods[25]. The NSS includes information on a number of sex-specific items such as male and female clothing, toiletries, and jewellery (considered to be mostly female-owned). Table 4.8 shows Engel curve estimates for identifiable male and female goods respectively. All clothing items examined are normal goods, while household toiletries are normal goods, male and female toiletries exhibit inferior good properties. One would therefore expect the pure income effect due to prohibition to be negative for clothing and positive for sex-specific toiletries.

Complete prohibition increased expenditures on both male and female clothing. It is interesting to note the difference in the impact across male clothing items by prohibition type[26] which may be related to the type of alcohol consumed by groups wearing dhotis and lungis respectively. Dhotis tend to be worn mainly by Hindu men and the data indicates

system which transferred child allowance to women. They find that this contributed to a significant increase in female and child-specific goods. Quisumbing and Maluccio (2000) examine intrahousehold allocations in four developing countries and find that higher relative resources controlled by women increase budget shares spent on child education.

[24] Note that the effect is positive for complete prohibition and negative for partial prohibition.

[25] It was not possible to identify other age-specific goods to examine the effects of prohibition on older-household members.

[26] Complete prohibition significantly increased budget shares of lungis but not of dhotis, while partial prohibition increased dhoti budget shares but not of lungis.

that arrack budget shares are significantly higher and statistically different for households spending money on dhotis relative to lungis.

Complete and partial prohibition significantly increased sari budget shares but decreased chaddor budget shares. The difference in result between saris and chaddors is interesting given that chaddors are typically worn by women to conceal their figures when venturing outside the home. The implication is therefore that prohibition and lower alcohol consumption – perhaps due to effects on crime or perceived safety – increased female mobility[27]. The alleged decrease in crime, particularly the molestation of females by drunks, has been a key argument of women's welfare groups against liquor. While the evidence linking crime and alcohol is very strong, it is interesting to observe that alcohol policy is associated strongly with changes in expenditures which reflects the greater mobility of women.

The effect of complete prohibition on sex-specific toiletries is negative for complete prohibition periods. There was no effect on budget shares of jewellery which is plausible given their high per unit cost and as they are traditionally purchased for special occasions such as weddings and births. Partial prohibition also increased saree and dhoti budget shares but had a significant negative effect on chaddors and toiletries. For all sex-specific goods examined the effect of prohibition on budget shares was small.

4.5.4 Robustness Checks

Underreporting

The results above suggest that prohibition had significant effects on the intrahousehold allocation of resources. However, whether this is an *actual* change in outlays as opposed to a *statistical* one warrants further discussion. It can be argued that if underreporting exists and is correlated with prohibition, then respondents simply exclude alcohol expenditures from the survey during prohibition periods or report alcohol expenditures under different heads. In other words, when alcohol consumption is illegal, alcohol expenditures are frequently reported as zeros or missing observations.

The implications of systematic underreporting on the effects of prohibition on alcohol

[27] In fact results on the effects of prohibition on crime suggest that prohibition may have resulted in a fall in rape cases.

consumption have been discussed in Chapter 3[28]. For the analysis in this Chapter, the nature of underreporting and the method by which total expenditure is calculated is key in determining whether the budget shares of all other items are being correctly captured, in spite of underreporting. If underreporting takes the form of omitted alcohol expenditures and total expenditure is aggregated from all expenditures, then underreporting will lower reported total expenditures and artificially increase the budget shares of all other items. On the other hand, if total expenditure is reported separately, for example under a separate question heading, then it is likely that total household outlays are recorded correctly and the budget shares of non-alcohol items are calculated accurately. Alternately, underreporting may take the form of respondents inputting alcohol expenditures onto other households items such as toiletries or food. This form of underreporting, while possible, is extremely unlikely in recall surveys as it requires a high level of technical sophistication. This is corroborated by studies of underreporting which have found that for UK consumption expenditure surveys, underreporting of this nature is very rare (Kemsley et al (1980)).

There is some uncertainty as to how the National Sample Survey Organization, which is the body who administers and computerises the NSS, actually collects and calculates total expenditure figures. From the author's investigations it appears that their approach, at least with respect to the issue at hand, does not offer conclusive guidance. In general, interviewers begin the expenditure survey by asking households their total expenditure and then work backwards to each broad item group and then to the subgroups within them. Total expenditure is therefore a separate question in the consumer-expenditure survey. This approach would suggest that even if alcohol consumption was not reported accurately during prohibition, total expenditures would be correctly measured and by design so would budget shares of all other goods. However, at the data processing and cleaning stage, total expenditures are also calculated by summing across all consumption items and some attempts are made to cross-check with totals from the originally stated expenditure and correct inconsistent figures. Furthermore, it is not clear to what extent the final total expenditure figure given in the dataset is the initial reported total expenditure or the corrected sum. Response from the National Sample Survey Organization on this issue is

[28] See Section 3.6.4 for the discussion on underreporting.

limited[29] and to the author's knowledge there have been no systematic studies of this in the past.

The view taken here is that there is limited scope for truly knowing the extent and nature of underreporting and its effect on the budget shares of other items. Chapter 3 noted that the incentives for consumers to underreport during prohibition are very low given the penalties involved, the limited effective enforcement on consumers, and the nature of the NSS household survey. In addition, the finding that reported consumption for some types of prohibited alcohol (which are all subject to the same fines) actually increased during prohibition lends some support against the severity of underreporting. With respect to the analysis in this chapter, underreporting resulting from items being dropped from the survey and total expenditures calculated from the sum of all items, would result in an upwards bias on the effect of prohibition on all budget shares in the household consumption bundle. The results indicate significant negative effects of prohibition for several item groups. In the absence of systematic factors which affect both underreporting and prohibition, it can therefore be argued that underreporting does not appear to be prevalent in the data. There is therefore a strong case that the estimated effects of prohibition of household budget share patterns are real changes and not simply statistical.

Endogeneity

The specification in Equation 4.7 assumes that prohibition is exogenous to household consumption patterns, that is there are no problems of simultaneity or spurious correlation. However, it could be argued that the direction of causation runs from the left-hand side to the right such that the pattern of household expenditure shares determine prohibition policy. This may be if, for example, states or periods with high budget shares of food (indicating relative poverty) are correlated with preferences for alcohol and prohibition. There is also the potential problem of spurious correlation which implies that any detected effect of prohibition is actually capturing the effect of a latent variable which affects both prohi-

[29] The NSSO is extremely reluctant to discuss the potential discrepancies in the total expenditure figures and were vague regarding extent of cleaning of the expenditure data series. It is therefore not possible to ascertain to what extent to variable in the datasets are from calculated total expenditures from summing up the outlays for each item versus the actual response from the household to the total expenditure question.

bition policy and the nature of household consumption bundles. For example, if particular political parties are associated with prohibition policy as well as policies which may affect household expenditures such as through higher government spending on welfare or food distribution programs.

The case for simultaneity requires plausible arguments for why state-wide, yearly changes in household allocation patterns would be correlated with prohibition policy[30]. A leading explanation may be shocks to food availability in the form of floods, droughts, and other factors causing a drop in food production which may precipitate political action in the form of prohibition policies. The effect of adverse shocks on policy was examined in Chapter 2 which found that shocks to food availability, measured by the occurrence of floods and drought, falls in food grain production, and value of flood damage, did not determine prohibition policy. There was also no effect of real per capita state income, poverty or income inequality which are the most plausible indicators of differences in household allocation patterns across states and over time.

Aside from simultaneity, an additional concern is that of spurious correlation such that the estimated observed effects on consumption are not due to prohibition but of a latent omitted variable which affects both. Chapter 2 found prohibition policy to be enacted during election years in predominantly rural states with a low concentration of alcohol factories and a high share of central union excise. Inclusion of these variables in Equation 4.7 does not change the main effect of prohibition on household resource allocations. Nevertheless, given that the enactment of, prohibition is driven by political economy considerations there is the argument that regulating governments are also more active in other spheres affecting constituents welfare such as their consumption levels and bundles. The analysis in Chapter 2 does not suggest that any particular political party, or grouping of parties (left/centre/right), are more prone to prohibition policy. Despite this there is the possibility that parties which have enacted prohibition have certain unobserved properties which we have not accounted for and which may also determine policies in other spheres which may affect the household consumption bundle.

[30]This is because the specification already controls for state and year effects which may determine prohibition policy.

The approach taken in this chapter to ameliorate potential endogeneity concerns is to analyse the incidence of prohibition on alcohol consumption and non-alcohol expenditure patterns by household characteristics. It is illustrated that the effects of prohibition on household consumption are strongest for households who decreased consumption of alcohol most during prohibition periods. Unless, one can find reasons why such households are more influential in determining legislation we can deduce that the direction of causation runs from prohibition policy to the left-hand side and not vice versa. It is argued that, while imperfect, the suggestive evidence is strong that the changes in consumption patterns are not driving the changes in legislation at the state-level, but are driven by changes in alcohol demand at the household level resulting from prohibition.

4.6 Alcohol Prohibition and Household Characteristics

The basic results indicate that prohibition periods are associated with changes in household consumption patterns. However, it may be the case that periods of restrictive alcohol policy are correlated with distinct patterns of household consumption at the aggregate - i.e. the direction of causation runs from the left-hand-side to the right rather than vice versa. Alternately the same factors driving prohibition at the state level may also be driving changes in the pattern of household expenditures. To the extent that these may be state-level or year fixed variables, the state and year fixed effects control partly for this. However, state-year changes are not controlled for and may be driving both prohibition and changes in the household consumption bundle.

One way to investigate this further is to examine characteristics of households consuming alcohol and most affected by prohibition, and then examine whether the same households exhibit significantly different effects on budget shares due to prohibition policy. The analysis in Chapter 3 found the following household characteristics to be correlated with alcohol consumption: household demographic composition, SC/ST status of the household, sex and literacy of the household head, and the rural/urban location of the household. In addition, each characteristic was estimated to respond differentially to prohibition policy.

Household composition is an intuitive choice as male adults comprise the majority of

alcohol consumers in India. This is examined in Table 4.10 which reports F-Tests of the effect of disaggregated household sex-age groups on alcohol consumption based on estimates of Equation 4.7 with alcohol on the left-hand side[31]. The test results corroborate the qualitative evidence that alcohol is consumed predominantly by adult males - households with a higher proportion of males in the 30-54 age group spend a significantly higher budget share on alcohol relative to households with higher proportion of females in the same age category. In addition, households with more female children tend to have higher alcohol budget shares particularly in the 2-4, 5-9 and 15-19 age groups lending support to the argument that gender discrimination may manifest itself by adults reducing consumption of adult goods more for male children relative to female.

Given that household demographic composition and alcohol consumption are related, we would expect prohibition policy to have a differential impact on alcohol budget shares by the age-sex characteristics of the household. In particular we would expect consumption of alcohol to decrease more significantly in households with a high proportion of adult males. Part B of Table 6 reports F-tests for the interaction effects of prohibition with broad age-sex groups. The results indicate that prohibition did indeed have differential effects by household age-sex groups. In general, alcohol budget shares reduced significantly more in households with more adult males during prohibition periods. During periods when consumption of certain alcohol types increased e.g. IMFL during periods of only arrack prohibition and toddy during complete prohibition, we see that the consumption response during prohibition increased significantly more in households with a higher proportion of adult males. There is also some weak evidence of a greater response in households with more female children as one would expect given that these households tend to have higher alcohol consumption as reflected in Part A of Table 6.

The interaction effects between prohibition policy and household age-sex groups on consumption budget shares are reported in Table 4.11. Given that alcohol consumption decreased more in households with a higher proportion of adult males we would expect the effects on budget shares to be greater (either positive or negative) in households with more adult males relative to adult females. F-tests of equality of interactions across the expen-

[31] All coefficients for all alcohol types are positive.

diture groups analysed above suggest the following: for sex and age neutral consumption groups such as food and fuel, prohibition had a larger impact on households with disproportionately more males. On sex-specific items, the effect on budget shares due to prohibition differed according to household composition, being significant and positive in households with relatively more adult males for male goods and vice versa. For child goods, the interaction effects were also significant i.e. households with more adult males had a greater impact on consumption bundles with the direction of the change being mixed but significant - for example, the impact on baby food was positive and the impact on milk negative.

The broad pattern found for the effect of prohibition, demographic composition and the intrahousehold allocation of resources is also found for other household characteristics with different preferences for alcohol. Chapter 3 found several other household characteristics to be correlated with alcohol consumption. In particular, the Engel curve estimates in Table 3.3 show that SC/ST members consumed significantly more alcohol than General Caste households, and rural households consume more relative to urban households. On the other hand, female headed households and literate households consume significantly less alcohol relative to male-headed and illiterate households. Furthermore, Table 3.9 showed that the incidence of prohibition differed by SC/ST status, rural/urban location, literacy of household head and sex of the household head. Given these differential effects, prohibition should also have differential effects on household resource allocation by characteristic. This is shown in Table 4.12 which reports the interaction of complete and partial prohibition with household characteristics on household consumption budget shares. It can be seen that for all groups prohibition, on the whole, had significantly different effects on the budget shares of the household consumption bundle[32] even for small expenditure items such as amusement services.

Overall these results suggest that the estimates are correctly picking up causal effect of prohibition on the budget shares of other goods i.e. households which experienced the greatest change in alcohol consumption due to prohibition policy, are also the households where we observe greater changes in the pattern of consumption. It is difficult to argue that

[32]The insignificant effects for total food shares mask important differences within food sub-groups as highlighted by the results for grains and cereals and milk items.

the estimates are picking up the effect that these particular households differentially affect the probability of prohibition. It is also hard to make the case that they are all affected by underlying latent variables which also drive prohibition. For example, it can be argued that rural and urban constituents or SC/ST households have differential preferences for both policy and household consumption, but it is harder to make the same case for household composition, or the literacy and sex of the household head. The latter is particularly difficult given that state income per capita, poverty, and inequality were found not to be correlated with prohibition legislation.

4.7 Private and Social Effects of Prohibition

A key argument of temperance groups for prohibition has been the negative private and social effects of alcohol use. This section examines the effect of prohibition on specific indicators of alcohol-related negative effects using states-level data for India over 1957-2001. The analysis starts by examining private effects of alcohol use, such as disease and death rates, and then proceeds to examine associated social effects, including road accident fatalities and crime rates.

4.7.1 Private Harm

Private effects associated with alcohol comprise the various medical conditions directly caused by alcohol consumption, and others for which alcohol is attributed as the primary determinant. Overall, causal relationships have been identified between average consumption of alcohol and more than 60 types of diseases and injury including alcoholic psychosis, alcohol dependence syndrome, alcohol abuse, alcoholic polyneuropathy, alcohol cardiomyopathy, alcoholic gastritis, alcoholic liver cirrhosis, and ethanol toxicity and methanol toxicity (WHO (2001)). Alcohol consumption is also associated with higher death rates from injuries, suicide, poisoning, haemorrhagic stroke, pancreatitis, as well as cancers of the oral cavity, pharynx, larynx, oesophagus, liver, and breast[33]. The extent and nature of alcohol

[33]See Andreasson et al (1988) for literature on higher death rates; Anderson (1995) for research on poisonings; Donahue et al (1986) and Klatsky (1989) for studies on haemorrhagic strokes; Singh and Simsek (1990) on pancreatitis; and IARC (1988) on cancers associated with alcohol consumption.

problems is associated both with the level of consumption and patterns of drinking (Edwards et al (1994)). It should be noted that the medical literature has found moderate-to-light alcohol consumption to have a *protective effect* against specific illnesses such as coronary heart disease, ischemic stroke, cholelithiasis, and non-insulin dependent diabetes mellitus[34]. However, these positive effects do not ameliorate the other risks associated with excessive alcohol consumption.

Identifying meaningful indicators for monitoring alcohol-related harm is important in order to accurately estimate the effect of alcohol prohibition on the private negative effects of alcohol use. For most alcohol-related problems, drinking is not the sole determinant of disease or death, but part of a group of factors that lead to an increased risk of harm, and ultimately to the condition itself. The available data on diseases and deaths directly caused by alcohol in India is limited to reported incidence of deaths due to spurious liquor. This includes any illegally available liquor which cannot be safely consumed without a high risk of poisoning or other health risks such as blinding or liver failure. Deaths from spurious liquor may arise if legally produced[35] liquor is adulterated with drugs such as diazepam or chemicals like chloralhydrate to give them an extra kick, or if illegally brewed alcohol is non-potable (Manor (1993)). In addition to spurious liquor deaths, the analysis in this chapter focuses on diseases and death for which alcohol is attributed as the major cause, or as one of the significant causal factors. These include incidence of liver cirrhosis, liver-related diseases and deaths, and deaths from poisoning. For all indicators, the WHO (2001) has estimated that alcohol has contributed to at least 30% of cases worldwide[36].

The effect of prohibition on indicators of private harm was inferred by estimating reduced-form models of the following form:

[34] See Doll et al (1994); Thun et al (1997); Jackson et al (1991) for results on alcohol consumption and coronary heart disease. See Rodgers et al (1993); Palomaki and Kaste (1993); and Bogoussalavsky et al (1990) for details on ischemic strokes. See Thornton et al (1986); English et al (1994) for information on cholelithiasis. See Rimm et al (1995) and Kiechl et al (1996) for research on diabetes mellitus.

[35] This may be smuggled from non-prohibition states or liquor which is not subject to prohibition such as toddy during periods of arrack prohibition.

[36] For example, in non-tropical developed countries with substantial alcohol consumption, alcohol is attributed to cause more than 80 % of liver cirrhosis cases, although hepatitis B and C are also significant determinants in some parts of the world (Edwards et al (1994)).

$$N_{st} = \alpha + \beta \ln X_{st} + \mu P_{st} + \rho_s + \delta_t + \varepsilon_{st} \tag{4.8}$$

where N is the measure of private harm in state s and year t, X is a set of state-level controls including real state income per capita and log total population, P is the proportion of population under prohibition as described in Chapter 2[37], ρ and δ are state and year effects, and ε is the error term. The approach is reduced-form as alcohol prohibition is linked to alcohol consumption, which in turn, is linked to greater incidence of private harm. Equation 4.8 is estimated using the GLS estimator allowing for heteroskedasticity with each state having its own error variance. In particular, the error term ε_{st} is modelled as an AR(1) disturbance term with state-specific autocorrelation i.e. $\varepsilon_{st} = \rho \varepsilon_{st-1} + u_{st}$.

The data series used for each indicator is compiled from state-level sources for a long a time-series as was available. Full details for each variable are given in the Data Appendix. While there are several variables which may also determine the incidence of private harm and hence should be included in the specification in Equation 4.8, data availability on relevant indicators was poor. In so far as they are state and year specific they are controlled for by the fixed effects included. For the measures of liver disease and deaths, the annual lag was included to control for any systematic factors driving incidence. For example, given the long-term nature of liver disease, high past levels of treatment are likely to be related to high present levels of treatment. Lags were not included for the measures of accidental deaths, poisoning and spurious liquor deaths as these are more likely to be random in any given state and year and thus unlikely to be affected by systematic factors. Given that the effect of alcohol consumption on alcohol-related diseases is likely to ensue over several years, and due to potential simultaneity concerns (despite the results in Chapter 2 suggesting that the negative effects of alcohol are not significant determinants of prohibition policy), prohibition was lagged 1 election period. In addition, the analyses were repeated for lags of 1-4 years for the prohibition variable.

The results in Table 4.13 indicate that complete prohibition did not have any impact on the rate of accidental deaths and poisoning. There was a significant decrease in spu-

[37] The proportion was used as opposed to the dummy variable as the time period for the variables is from 1957-2001.

rious liquor poisoning and deaths from liver cirrhosis. The latter result confirms previous findings[38] that cirrhosis-death rates are sensitive to alcohol availability, and suggests that even for heavy-drinkers (the group at most risk from alcohol-related cirrhosis) alcohol consumption may be somewhat price sensitive. However, complete prohibition significantly increased the incidence of liver disease deaths, a finding which is difficult to reconcile with the negative effects found for spurious liquor and cirrhosis. One explanation may be that consumption of illegal liquor during prohibition periods has such severe effects so as to induce liver disease deaths aside from those caused by liver cirrhosis, which are associated with long-term accumulated high alcohol consumption. However, aside from alcohol poisoning due to overconsumption, it is difficult to find explanations for liver failure outside of spurious liquor poisoning which has been shown to decrease during prohibition. Alternately, it may be due to the differing time period of coverage of the variables – liver disease deaths (and treatment) are available over 1957-1985, while liver cirrhosis and spurious liquor deaths are available over 1973-1993 and 1984-1999. This argument is strengthened given that periods of prohibition across the whole state, which become common after the late 1960s, are not associated with increases in the rate of liver disease deaths.

4.7.2 Social Externalities

Aside from the private effects of alcohol use, excessive alcohol consumption leading to intoxication is also associated with several negative externalities. Levitt and Porter (2001) find that in the United States drunk drivers are involved in 30% of all fatal accidents on the road, a proportion which increases to 60% in periods when alcohol consumption is greatest. There is also significant evidence that alcohol use is linked to criminal and violent behaviour[39]. The Bureau of Justice Statistics (1988) reports that in the United States approximately 60% of all persons convicted of assault and 30% of convicted burglars had been drinking just prior to the crime. This is further corroborated by Markowitz (2000a; 2000b), who finds that alcohol consumption across a group of countries is linked to a higher incidence of assault, robbery, and rape; and Grossman and Markowitz (1999) who find that

[38] See Cook and Moor (1999).
[39] See Miczek et al (1994) for a review of the literature.

violence in US campus is negatively linked to alcohol prices. There is also a well-established link between excessive alcohol use and family violence – in reviews of the literature, Gelles and Cornell (1990) and Leonard (1993) note that in almost every study of family aggression alcohol is found to be a strong correlate of violence[40]. In addition to these more *direct* social externalities, there are indirect effects of excessive alcohol use, such as increases in tax burdens due to higher costs of treating alcohol-related diseases and increases in insurance premiums due to increased incidence of motor vehicle accidents.

The link between prohibition and social externalities was examined by estimating reduced-form equations similar to Equation 4.8 using measures of social externalities on the left-hand side[41]. These include deaths from motor vehicle accidents and crime rates by crime group such as rapes, burglaries, robberies, theft, murders, and dacoity. Information on domestic violence was limited and therefore excluded. The crime data are based on reported cases compiled by local police officers and, together with the data on number of police officers, are available over 1965-2001[42]. Road accident fatalities are available over 1970-1999 and are compiled from Accidental Deaths and Suicides in India. Full details of the dataset and variables are in the Data Appendix. As with private effects, Equation 4.8 was estimated using the GLS estimator corrected for panel-level heteroskedasticity and an AR(1) state-specific error term.

The approach requires two assumptions to hold – first that alcohol consumption leads to greater incidence of the negative externality and second that prohibition reduces alcohol consumption. In addition, prohibition itself should not contribute to crime, a fairly strong assumption discussed below. The link between alcohol and motor vehicle fatalities and crime have been fairly well established in the literature and reviewed above. Furthermore, the analysis in Chapter 3 has shown that alcohol prohibition significantly reduced alcohol participation and consumption. This, together with the observation that similar reduced-

[40] See also Markowitz (1999) who finds a direct relationship between alcohol price and spousal violence; Markowitz and Grossman (1999b) who find a similar relationship for violence towards children.

[41] In addition to the present state controls, proportion of urbanization, literacy rates and proportion SCST population were also analysed. Similar to Dreze and Khera (2000) I find limited effects of urbanization (contrary to the popular association of crime with cities), negative significant effects of literacy and positive effects of the proportion of SC/STs. Results were not reported for these specifications as data are available only up to 1991.

[42] The only exception is rape which is available for 1983-2001.

form analyses have found significant effects of alcohol policy, suggests that the approach taken is suitable to infer the effect of prohibition on externalities. It should be noted that the analysis examines the effects of intoxication of both the perpetrator and victim, in that alcohol use may induce criminal behaviour but also increases the probability of being a victim.

The assumption that prohibition does not perpetuate crime requires further discussion. The regulatory vacuum caused by prohibition may result in the expansion of certain types of criminal activity. In particular, organized crime may expand into supplying black market liquor or offer protection services to suppliers to maintain or expand liquor market sales. The large rents available for extraction are also associated higher incentives for the corruption of the police, public officials (such as prohibition enforcement agents), and politicians. Thornton (1991) reports that in the US, corruption of law enforcement agencies was a major feature of Prohibition. For example, the Wickersham Report (1931) which reviewed the first 10 years of Prohibition notes that by June 1930 more than 1600 civil servant employees had been dismissed for causes related to corruption or dereliction of duty.

Prohibition may also increase criminal behaviour in individuals consuming alcohol by increasing the cost of consumption. As the effective price of alcohol increases, the risk of criminal activity falls resulting in a higher probability of petty and property crime. While, this assumes a particular view of the determinants of crime[43] and may hold mainly for heavy consumers of alcohol, studies of heroin addicts have found that price increases leads to increased criminal behaviour (Thornton (1991)). In addition, the enforcement of prohibition may divert limited police resources from monitoring other crime, causing an increase in their incidence. Benson et al (1990) find this effect for drugs, particularly that increased enforcement of illegal drugs have decreased enforcement against property crimes thereby increasing the rate of their occurrence.

Table 4.14 contain the estimates of the effects of prohibition on crime rates and road accident fatalities. The results suggest that contemporaneous complete prohibition had a significant negative effect on total number of crime cases[44], driven mainly by a fall in

[43]The assumption here is that crime is driven by environmental and economic factors as opposed to genetic ones such as tendencies for aggression. See Thornton (1991) for a discussion of the various theories of crime.

[44]Note the result in Chapter 2 crime was not found to be significant in determining prohibition.

burglary cases. When annual lags are examined to ameliorate simultaneity concerns, prohibition is found to significantly increase the incidence of murders and decrease burglaries. However, these effects offset one another resulting in an insignificant overall effect on total crime cases. There does not appear to be any further effect on the other types of crime examined, although there is a negative effect of prohibition on the number of rape cases in some specifications[45]. The main results for complete prohibition hold for periods of arrack prohibition and for alternately defined crime variables for example, crime per thousand population and proportion of each crime sub-group of total crime[46].

The negative effects of prohibition on total crime and burglary follow from the discussion of alcohol consumption and criminal behaviour. If prohibition reduces consumption then tendencies for criminal behaviour are reduced causing a fall in crime rates[47]. On the other hand, prohibition may itself induce criminal behaviour through the creation of black markets and regulatory vacuums leading market participants to use violence to solve commercial disputes. This may explain the significant increase in murder rates due to prohibition, a result which Miron (1999a) also finds for the US prohibition of alcohol. Conlin and et al (2001) find that country-level prohibition of alcohol in the US is related to higher illicit drug related crimes lending further support to this hypothesis.

The analysis finds no significant effect of alcohol prohibition on road accident fatalities (Table 4.14). The result is surprising given the significant decline in consumption due to prohibition, and the findings of several studies that stricter alcohol policy, including prohibition, reduces the rate of motor vehicle fatalities. For example, Brown et al (1996) show that county-level prohibition in Texas reduces the rate of fatal alcohol-related motor vehicle accidents, and Wim and Giacopassi (1993) show that country-level prohibition in Kentucky is associated with lower alcohol-related road accidents[48]. However, replicating these findings for India may be difficult given the low incidence of motor vehicle ownership

[45]The results are for numbers of rape cases.

[46]The log of crime cases was reported as this was the more relevant indicator given that population is controlled for in the regressions. In addition, crimes per thousand population and the proportion of each crime group in total crime resulted in very small coefficients for some of the categories.

[47]A priori, there is no reason why alcohol consumption should cause a fall in burglaries as opposed to other types of crime. However, given there was no data on assaults a strict comparison cannot be made as to which type of crime is affected by prohibition the most.

[48]See also Saffer and Grossman (1987); Chaloupka et al (1993); and Wilkinson (1987).

which was approximately 0.063 per thousand population in 2001. This makes it harder to infer a decrease in alcohol-related motor vehicle accident fatalities from prohibition due to a lack of variation in the data and because the level of such accidents is small to begin with.

4.8 Conclusion

The negative effects of alcohol use have been at the forefront of arguments for the prohibition of alcohol. Alcohol use, particularly in low-income countries, has been argued to divert limited resources from more productive household expenditures and differentially affect the welfare of women and children. Alcohol consumption has also been associated with significant private and social detrimental effects. This chapter examined the effect of alcohol prohibition on these negative effects by examining the changes in the pattern of demand for household items, alcohol-related disease and death, and disaggregated crime rates.

The main results from the econometric analysis on intrahousehold allocations are that prohibition had significant effects on household expenditure patterns. Specifically, prohibition increased food and fuel budget shares, the former mainly due to increases in consumption of pulses, fruits and vegetables, and dairy products. It also shifted resources towards amusement services, perhaps as a substitution for alcohol. On the other hand, prohibition decreased budget shares of education goods, household appliances and utensils, and household toiletries. These effects also hold for child-specific goods with prohibition increasing shares of baby food and milk but decreasing child education expenditures. The allocation of resources does not appear to follow sex-lines with both male and female clothing increasing and sex-specific toiletries decreasing.

The analysis of household expenditures by household characteristics show that intrahousehold resource reallocations were greatest in households who consumed significantly more alcohol. These effects are particularly significant for households with a large proportion of male adults, who have a high rate of alcohol consumption which was differentially affected by prohibition policy. Similar patterns are also observed for SC/ST households, rural households, and female and literate household heads.

Given the significant negative effects on budget shares of some household items due to

prohibition, underreporting, in the sense that items are declared missing or less than actually spend, is not endemic in driving the results. The incentive for underreporting related to prohibition in household consumption-expenditure surveys is limited but its absence cannot be guaranteed. With respect to the endogeneity of prohibition policy, the interactions with household characteristics indicate that the estimated changes in the consumption bundle are being driven by changes in alcohol consumption due to prohibition rather than vice versa. In addition, they lend support to the argument of limited spurious correlation as prohibition policy appears to have impacted household expenditures most in households consuming alcohol. Since these households do not significantly affect policy-making and are not necessarily the same households most likely to benefit from government spending plans, the argument that latent political variables are driving the observed results is weak.

Overall the estimated effects of prohibition on intrahousehold resource allocations are small which is expected given that alcohol is only 4% in the household budget of the household budget. This is not to say, however, that the associated welfare effects, at the household and societal level, are also small. While the analysis cannot infer whether household welfare increased or decreased due to the changes in the household bundle, the implication is that the welfare effects on other individuals within the household could be significant. This is particularly important if consumption was constrained at unsustainable levels prior to prohibition.

In addition to the intrahousehold effect of prohibition, the effect of prohibition on the other negative effects of alcohol use may be substantial. The analysis on alcohol related deaths and disease found prohibition to have a significant negative effect on spurious liquor and liver cirrhosis deaths. Prohibition had an estimated effect on alcohol-related social externalities by decreasing burglaries and total crime rates in turn. However, prohibition is associated with higher liver disease deaths, perhaps due a greater incidence of poisoning. There was also an increase in homicide rates similar to increases found for the US during prohibition. These effects suggest that while prohibition may have significant positive effects, it may itself cause detrimental side-effects and should therefore not be seen as a panacea.

4.9 Appendix 1: Data Appendix

The data for the analysis in this chapter come from several sources. The **household level** dataset used in the analysis of intrahousehold resource allocation is the same dataset used in Chapter 3 (See Appendix 1, Chapter 3 for further details). Specifically the data are from the National Sample Survey and household controls are as in Chapter 3. The list below indicates the consumption items in each broad group.

The **state-level** dataset used for the analysis of private and social negative effects of alcohol use is the same dataset used in Chapter 2 (See Appendix 2, Chapter 2 for further details).

Total Food: Grains and cereals, pulses, meat and fish, fruits and vegetables, dairy products, beverages, edible oils and spices, processed foods.

Grains and Cereals: Paddy, rice, chira, khoi/lawa, muri, other rice products, wheat, atta, maida, suji/rawa, sewai/noodles, bread/bakery, other wheat products, jowar, jowar products, bajra, bajra products, maize, ,aize products, barley, barley products, small millets, small millets products, ragi, ragi products, gram, gram products, tapioca/sago, tapioca (green), mahua, jack fruit seed, other cereal substitutes.

Pulses: Arhar/tur, gram (split gram), moong, urd, khesari, peas, soyabean, other pulses, basan, other pulse products.

Meat and Fish: Goat meat, mutton, beef, pork, buffalo meat, other meat, chicken, other birds, eggs, egg products, fresh fish, dry fish, canned fish, other fish/meat products.

Fruits and Vegetables: Potato, onion, radish, carrot, turnip, beat, sweet potato, arum, other root vegetables, pumpkin, gourd, bitter gourd, cucumber, parwal/patal, jhinga/torai, snake, other gourd, cauliflower, cabbage, brinjal, lady's finger, palak, other leafy vegetables, French beans and barbuti, tomato, peas, chillis, capsicum, plantain (green), jackfruit (green), lemon, other vegetables, banana, jack fruit, water melon, pine apple, coconut, guava, singara, orange/mausami, mango, kharbooza, pears/naspati, berries, leechi, apple, grapes, other fresh fruits, coconut/copra, groundnut, dates, cashew nut, walnut, other nuts, raisin, other dry fruits.

Dairy Products: Liquid milk, baby food, condensed/powder milk, curd, ghee, butter, ice-cream, other milk products.

Fuel and light: Coke, firewood and chips, electricity, dung cake, kerosene, matches (box), coal, coal gas, l.p.g., charcoal, other oils used for lighting, candle, methylated spirit, gobar gas, other fuel and light.

Educational Materials: Books/journals, newspapers/periodicals, library charges, stationary articles, tuition fees (school, colleges), other educational expenses.

Health Goods and Services: Allopathic medicine, homeopathic medicine, ayurvaidic medicine, unani medicine, family planning appliances, pathological test, other medical expenses.

Clothing and Footwear: Dhoti, sari, cloth for shirt/pyjama/salwar, cloth for trousers or overcoat, cloth for dupatta/wrapper/shawl, lungi, gamcha/towel/handkerchief, hosiery articles/stockings or undergarments, ready made garments, headwear, knitted garments/sweater or pullover/cardigan or muffler/scarf, bedsheet/bedcover, rug/blanket, pillow or quilt/mattress, cloth for upholstery/curtain or tablecloth, mosquito net, mats and matting, cotton/cotton yean, knitting wool, other clothing, leather boots/sandals/shoes/chappals, other leather footwear, rubber/PVC footwear, other footwear.

Toiletries: Toilet soap, tooth paste/tooth powder/tooth brush, powder/snow/cream/flower, hairoil/lotion/shampoo/haircream, comb, shaving blades, shaving stick and shaving cream, other shaving requisites, other toilet articles.

Amusement Services: Cinema/theatre, fair/picnic, sports/goods/toys, club fees, goods for recreation and hobbies, photography, video cassette/VCR or VCP, other amusement.

Recreational Goods: Gramophone and record player, radio, radiogram, television/VCR/VCP, camera and other photographic equipment, tape recorder, harmonium, piano, record cassette/audio cassette, video cassette, other musical instruments, other goods for recreation and entertainment and hobbies.

Furniture: Bed stead, almirah, dressing table, chair, coach/sofa, table/desk, stool/bench, suitcase/trunks/box/hand bag/other travel goods, foam/rubber cushion, carpet/daree/ other floor matting, paintings/drawings/engravings, other furniture and fixtures.

Household Utensils: Stainless steel utensils, bell metal utensils, copper utensils, aluminium utensils, iron utensils, brass utensils, enamel utensils, crockery utensils, other utensils, electric fan, stove, pressure cooker/pan, non-sticking pan, sewing machine, washing

machine, refrigerator, air conditionaer/cooler, lantern/lamp/tube light, electric iron/heater or toaster or other electric heating appliances, thermos/thermoware, ovens/other cooking and household appliances/equipment.

General Services: Private tutor, domestic servant/cook, sweeper, barber/beautician, washerman/launder, tailor, priest, legal expenses, postage/telephone/telegram, repair charges, miscellaneous expenses, pet animals, other consumer services, railway fare, bus fare, taxi/auto-rickshaw fare, bullock cart fare, airways fare, porter charges, steamer boat fare, rickshaw fare, horse cart fare, hand operated cart fare, petrol, diesel, lubricating oil, other imputed value of owned conveyance, school bus/van, other hired conveyance.

Baby Food: Baby food

Milk: Liquid milk, baby food, condensed/powder milk

Child Educational Goods: Books/journals, tuition fees (school, colleges).

Sari: Sari.

Chaddor: Cloth for dupatta/wrapper/shawl.

Female Toiletries: Powder/snow/cream/flower, hairoil/lotion/shampoo/haircream.

Jewellery: Gold ornaments, silver ornaments, jewels/pearls, other ornaments.

Dhoti: Dhoti.

Lungi: Lungi.

Male Toiletries: shaving blades, shaving stick and shaving cream, other shaving requisites.

Table 4.1: Summary of Main Variables

Variables	Mean	S.d.
Complete Prohibition Dummy	0.079	0.270
Arrack Prohibition Dummy	0.193	0.395
Partial Prohibition Dummy	0.115	0.318
Log P. C. Household Expenditure	5.633	0.780
Log Household Size	1.501	0.558
Sex of Head	0.080	0.272
Age of Head	44.155	13.313
Literacy of Head	2.201	2.111
Marital Status of Head	2.072	0.378
Land Ownership	0.602	0.489
Scheduled Caste/Tribe	0.243	0.429
Rural Sector Dummy	0.628	0.483
Proportion Females <2	0.017	0.056
Proportion Females 2-4	0.032	0.077
Proportion Females 5-9	0.050	0.097
Proportion Females 10-14	0.047	0.095
Proportion Females 15-19	0.042	0.095
Proportion Females 20-29	0.088	0.128
Proportion Females 30-54	0.142	0.146
Proportion Males <2	0.018	0.058
Proportion Males 2-4	0.035	0.081
Proportion Males 5-9	0.058	0.104
Proportion Males 10-14	0.057	0.105
Proportion Males 15-19	0.051	0.110
Proportion Males 20-29	0.096	0.168
Proportion Males 30-54	0.160	0.170
Proportion Males >55	0.055	0.126
Professional	0.064	0.245
Administrative/Executive/Managerial	0.033	0.178
Clerical	0.056	0.230
Sales Professionals	0.099	0.299
Service Professionals	0.044	0.205
Farmers	0.492	0.500
Production Workers	0.182	0.385
Labourers	0.030	0.171

Table 4.1 Cont: Summary of Main Variables

Variables	Mean	S.d.
Food Budget Share	0.595	0.244
Grains and Cereals Budget Share	0.251	0.187
Pulses Budget Share	0.034	0.026
Meat and Fish Budget Share	0.030	0.040
Vegetables Budget Share	0.070	0.040
Dairy Budget Share	0.073	0.083
Baby Food Budget Share	0.0004	0.005
Milk Budget Share	0.063	0.073
All Milk Products Budget Share	0.064	0.072
Child Education Goods Budget Share	0.012	0.038
Female Toiletries Budget Share	0.009	0.008
Powder Budget Share	0.002	0.004
Hair Oil Budget Share	0.007	0.006
Saree Budget Share	0.021	0.070
Chaddor Budget Share	0.002	0.014
Lungi Budget Share	0.003	0.015
Dhoti Budget Share	0.005	0.023
Male Toiletries Budget Share	0.001	0.003
Jewelry Budget Share	0.001	0.017
Fuel Budget Share	0.076	0.042
Clothing and Footwear Budget Share	0.046	0.089
Amusement Services Budget Share	0.005	0.011
Education Budget Share	0.035	0.096
Health Budget Share	0.039	0.081
Toiletries Budget Share	0.023	0.015
General Services Budget Share	0.059	0.071
Furniture and Fixtures Budget Share	0.002	0.023
Recreational Goods Budget Share	0.002	0.026
Utensils and Appliances Budget Share	0.004	0.026
Medicine Budget Share	0.037	0.074
Miscellaneous Goods Budget Share	0.021	0.015

Table 4.2: Engel Curves of Selected Food Budget Shares

	Food	Grains & Cereals	Pulses	Meat & Fish	Fruit & Vegetable	Dairy Products
	(1)	(2)	(3)	(4)	(5)	(6)
Log P. C. Expenditure	-11.995	-48.187	1.637	4.661	3.832	16.985
	(19.284)	(91.655)	(20.750)	(49.296)	(33.056)	(92.558)
Log P. C. Exp Squared	-0.511	2.931	-0.254	-0.361	-0.472	-1.316
	(9.880)	(68.235)	(38.982)	(44.840)	(47.810)	(85.575)
Log Household Size	-3.535	0.614	-0.280	0.530	-0.887	1.205
	(41.901)	(10.693)	(26.041)	(33.834)	(51.022)	(41.252)
Sex of Head	1.716	-1.341	-0.013	-0.235	-0.090	-0.124
	(11.819)	(13.507)	(0.739)	(8.172)	(3.065)	(2.511)
Age of Head	0.041	-0.015	0.002	-0.010	0.004	0.019
	(12.314)	(6.311)	(5.754)	(16.264)	(5.667)	(16.123)
Education of Head	0.235	-0.413	0.045	-0.114	0.156	0.413
	(12.806)	(33.349)	(20.623)	(31.710)	(43.942)	(60.392)
Marital Status of Head	-1.242	0.567	0.127	0.086	0.404	0.057
	(13.642)	(9.067)	(10.937)	(5.112)	(21.007)	(1.827)
Land Ownership	0.113	-0.108	0.113	0.001	0.094	0.544
	(1.311)	(1.829)	(11.344)	(0.055)	(5.727)	(20.762)
Scheduled Caste/Tribe	-1.481	1.566	-0.176	0.470	-0.287	-2.002
	(16.921)	(23.797)	(15.507)	(27.441)	(16.850)	(72.441)
Rural Dummy	-0.852	1.508	-0.030	-0.236	-0.483	-0.423
	(7.551)	(20.758)	(2.272)	(10.631)	(21.446)	
Constant	158.263	211.835	2.809	-9.467	4.840	-53.770
	(81.167)	(129.672)	(11.490)	(32.279)	(13.702)	(93.597)
R-squared	0.368	0.494	0.225	0.221	0.176	0.324

Notes: T-statistics calculated with robust standard errors clustered at the state level in parenthesis. All estimates include occupation, year and state dummies. Other explanatory variables include controls for household demographic structure as noted in the text. Total sample size is 600618.

Table 4.3: Effect of Prohibition on Food Budget Shares

	Total Food			Grains & Cereals			Pulses		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Complete Prohibition	0.117	0.831		-0.376	-0.012		0.068	0.204	
	(0.343)	(2.406)		(2.005)	(0.062)		(2.199)	(6.349)	
Partial Prohibition		2.325			1.185			0.442	
		(11.015)			(7.489)			(16.477)	
Arrack Prohibition			1.798			0.762			0.358
			(9.126)			(5.477)			(15.481)
Log P. C.	-11.995	-11.831	-11.868	-48.187	-48.104	-48.134	1.637	1.668	1.662
Expenditure	(19.284)	(19.033)	(19.100)	(91.654)	(91.523)	(91.621)	(20.753)	(21.245)	(21.161)
R-Squared	0.368	0.368	0.368	0.494	0.494	0.494	0.225	0.226	0.226
	Meat & Fish			**Fruits & Vegetables**			**Dairy Products**		
	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Complete Prohibition	-0.049	-0.049		0.334	0.295		0.014	0.182	
	(1.079)	(1.021)		(5.615)	(4.755)		(0.160)	(1.965)	
Partial Prohibition		0.001			-0.126			0.548	
		(0.025)			(2.832)			(9.352)	
Arrack Prohibition			-0.017			0.023			0.419
Log P. C.	4.661	4.661	4.659	3.832	3.823	3.833	16.985	17.024	17.014
Expenditure	(49.295)	(49.249)	(49.237)	(33.068)	(33.010)	(33.070)	(92.557)	(92.694)	(92.653)
R-Squared	0.221	0.221	0.221	0.176	0.176	0.176	0.324	0.324	0.324

Notes: T-statistics calculated with robust standard errors clustered at the state level in parenthesis. All estimates include occupation, year and state dummies. Other explanatory variables include controls for household characteristics, characteristics of the household head, and household composition as in Table 4.2. Total sample size is 600618.

Table 4.4: Engel Curves of Selected Household Goods Budget Shares

	Fuel	Education Items	Health Items	Furniture & Fixtures	Utensils & Appliances	Consumer Services
	(1)	(2)	(3)	(4)	(5)	(6)
Log P. C. Expenditure	-5.311	-6.873	5.310	-1.480	-0.692	-11.123
	(42.540)	(18.098)	(15.906)	(8.499)	(3.748)	(54.072)
Log P. C. Exp Squared	0.159	0.794	-0.166	0.171	0.115	1.269
	(15.281)	(22.752)	(5.541)	(10.430)	(6.580)	(67.463)
Log Household Size	-2.013	1.668	1.360	0.161	0.146	-0.009
	(107.483)	(37.685)	(32.303)	(11.334)	(9.332)	(0.329)
Sex of Head	-0.351	0.054	-0.637	-0.075	-0.080	0.294
	(11.576)	(0.674)	(8.826)	(3.464)	(3.431)	(6.445)
Age of Head	0.001	0.011	-0.010	-0.002	-0.004	0.005
	(0.184)	(6.555)	(5.859)	(4.514)	(6.582)	(5.090)
Education of Head	0.047	0.438	-0.278	-0.015	-0.031	0.417
	(12.853)	(44.563)	(29.567)	(5.287)	(9.718)	(75.370)
Marital Status of Head	0.503	0.195	0.183	0.053	0.064	-0.215
	(24.288)	(4.487)	(4.165)	(3.983)	(4.854)	(7.067)
Land Ownership	0.026	0.016	-0.268	0.009	-0.007	-0.946
	(1.546)	(0.358)	(7.216)	(0.797)	(0.562)	(38.099)
Scheduled Caste/Tribe	-0.118	-0.074	0.196	0.041	0.057	-0.307
	(6.295)	(2.186)	(5.366)	(4.295)	(5.140)	(15.851)
Rural Dummy	-0.661	-0.888	0.998	0.083	0.138	-1.802
	(30.357)	(16.699)	(21.172)	(5.994)	(9.372)	(58.593)
Constant	36.164	10.171	-19.766	2.736	5.113	25.383
	(93.241)	(9.763)	(20.679)	(5.897)	(10.380)	(43.686)
R-squared	0.231	0.177	0.058	0.020	0.081	0.351

Notes: T-statistics calculated with robust standard errors clustered at the state level in parenthesis. All estimates include occupation, year and state dummies. Other explanatory variables include controls for household demographic structure as noted in the text. Total sample size is 600618.

Table 4.4 Cont: Engel Curves of Selected Household Goods Budget Shares

	Clothing & Footwear (7)	Household Toiletries (8)	Amusement Services (9)	Recreational Goods (10)
Log P. C. Expenditure	10.742 (28.756)	1.360 (34.824)	0.777 (18.674)	-1.999 (10.513)
Log P. C. Exp Squared	-0.311 (9.219)	-0.173 (52.738)	-0.044 (12.165)	0.226 (12.540)
Log Household Size	2.353 (43.579)	-0.461 (68.703)	0.083 (14.628)	0.231 (14.255)
Sex of Head	-0.166 (1.806)	0.355 (31.720)	0.106 (12.543)	-0.067 (2.526)
Age of Head	-0.023 (11.700)	0.005 (23.438)	-0.001 (0.832)	-0.003 (4.397)
Education of Head	-0.341 (29.507)	0.125 (92.880)	0.024 (22.147)	-0.025 (6.998)
Marital Status of Head	0.193 (3.434)	-0.113 (15.012)	-0.064 (10.889)	0.078 (5.546)
Land Ownership	0.096 (2.124)	-0.025 (4.241)	-0.031 (6.534)	-0.030 (2.257)
Scheduled Caste/Tribe	0.508 (10.975)	-0.178 (30.090)	0.021 (5.105)	0.049 (4.308)
Rural Dummy	1.721 (28.626)	-0.338 (42.821)	-0.257 (41.834)	0.107 (6.638)
Constant	-48.915 (44.800)	-0.061 (0.502)	-2.803 (22.684)	3.798 (7.546)
R-squared	0.152	0.233	0.132	0.016

Notes: T-statistics calculated with robust standard errors clustered at the state level in parenthesis. All estimates include occupation, year and state dummies. Other explanatory variables include controls for household demographic structure as noted in the text. Total sample size is 600618.

Table 4.5: Effect of Prohibition on Household Goods Budget Shares

	Fuel			Education Items			Health Items		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Complete Prohibition	0.551	0.586		-0.079	0.028		-0.134	0.037	
	(10.379)	(10.383)		(0.503)	(0.177)		(1.174)	(0.309)	
Partial Prohibition		0.110			0.379			0.587	
		(2.538)			(2.654)			(4.230)	
Arrack Prohibition			0.279			0.204			0.295
			(6.964)			(1.716)			(2.885)
Log P. C.	-5.309	-5.301	-5.289	-6.872	-6.855	-6.866	5.312	5.332	5.317
Expenditure	(42.548)	(42.496)	(42.378)	(18.094)	(18.056)	(18.083)	(15.911)	(15.970)	(15.928)
R-Squared	0.231	0.231	0.231	0.177	0.177	0.177	0.058	0.058	0.058
	Furniture & Fixtures			**Utensils & Appliances**			**Consumer Services**		
	(10)	**(11)**	**(12)**	**(13)**	**(14)**	**(15)**	**(16)**	**(17)**	**(18)**
Complete Prohibition	-0.106	-0.089		-0.026	-0.083		0.154	0.180	
	(3.258)	(2.685)		(1.106)	(2.944)		(2.015)	(2.339)	
Partial Prohibition		0.066			-0.219			0.080	
		(2.273)			(4.558)			(1.168)	
Arrack Prohibition			-0.007			-0.155			0.116
			(0.301)			(4.458)			(2.080)
Log P. C.	-1.472	-1.474	-1.479	-0.690	-0.682	-0.677	-11.122	-11.116	-11.114
Expenditure	(8.459)	(8.469)	(8.494)	(3.733)	(3.692)	(3.667)	(54.073)	(54.066)	(54.052)
R-Squared	0.020	0.020	0.020	0.081	0.081	0.081	0.351	0.351	0.351

Notes: T-statistics calculated with robust standard errors clustered at the state level in parenthesis. All estimates include occupation, year and state dummies. Other explanatory variables include controls for household characteristics, characteristics of the household head, and household composition as in Table 4.2. Total sample size is 600618 for fuel and consumer services, 375970 for education and health items, and 298200 for furniture and utensils.

Table 4.5 Cont: Effect of Prohibition on Household Goods Budget Shares

	Clothing & Footwear			Household Toiletries		
	(19)	(20)	(21)	(22)	(23)	(24)
Complete Prohibition	0.255	0.341		-0.135	-0.181	
	(1.864)	(2.351)		(7.391)	(9.499)	
Partial Prohibition		0.275			-0.143	
		(1.825)			(8.657)	
Arrack Prohibition			0.296			-0.157
			(2.342)			(11.099)
Log P. C. Expenditure	10.729	10.725	10.728	1.359	1.349	1.348
	(28.724)	(28.706)	(28.697)	(34.823)	(34.606)	(34.592)
R-Squared	0.152	0.152	0.152	0.233	0.233	0.233
	Amusement Services			**Recreational Goods**		
	(25)	(26)	(27)	(28)	(29)	(30)
Complete Prohibition	0.070	0.067		-0.072	-0.069	
	(5.640)	(5.197)		(2.132)	(1.963)	
Partial Prohibition		-0.009			0.011	
		(0.613)			(0.314)	
Arrack Prohibition			0.018			-0.027
			(1.547)			(0.931)
Log P. C. Expenditure	0.777	0.776	0.778	-1.993	-1.994	-1.997
	(18.681)	(18.614)	(18.664)	(10.472)	(10.471)	(10.489)
R-Squared	0.132	0.132	0.132	0.016	0.016	0.016

Notes: T-statistics calculated with robust standard errors clustered at the state level in parenthesis. All estimates include occupation, year and state dummies. Other explanatory variables include controls for household characteristics, characteristics of the household head, and household composition as in Table 4.2. Total sample size is 600618 for toiletries and amusement services, 313470 for clothing and footwear, and 298200 for recreational goods.

Table 4.6: Engel Curves of Child Goods Budget Shares

	Baby Food	Total Milk	Child Education Items
	(1)	(2)	(3)
Log P. C. Expenditure	0.182 (15.311)	12.947 (80.757)	-0.806 (7.013)
Log P. C. Exp Squared	-0.013 (13.432)	-1.035 (76.753)	0.161 (14.873)
Log Household Size	0.011 (5.386)	1.042 (39.988)	0.850 (46.630)
Sex of Head	0.007 (1.856)	-0.162 (3.675)	0.020 (0.604)
Age of Head	0.001 (2.227)	0.017 (16.174)	0.005 (7.103)
Education of Head	0.005 (11.575)	0.344 (56.419)	0.211 (50.563)
Marital Status of Head	0.009 (4.912)	0.031 (1.121)	0.120 (6.791)
Land Ownership	0.001 (0.421)	0.482 (20.388)	-0.001 (0.060)
Scheduled Caste/Tribe	-0.008 (4.972)	-1.719 (69.452)	-0.027 (1.827)
Rural Dummy	-0.017 (7.160)	-0.443 (13.986)	-0.408 (18.437)
Constant	-0.512 (13.986)	-38.977 (77.654)	-1.986 (6.262)
R-squared	0.019	0.277	0.186

Notes: T-statistics calculated with robust standard errors clustered at the state level in parenthesis. All estimates include occupation, year and state dummies. Other explanatory variables include controls for household demographic structure as noted in the text. Total sample size is 600618.

Table 4.7: Effect of Prohibition on Child Goods Budget Shares

	Baby Food			Total Milk			Child Education Items		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Complete Prohibition	0.012	0.014		0.204	0.383		-0.147	-0.188	
	(2.163)	(2.374)		(2.751)	(4.981)		(2.281)	(2.870)	
Partial Prohibition		0.006			0.584			-0.162	
		(1.582)			(11.043)			(3.885)	
Arrack Prohibition			0.009			0.513			-0.172
			(2.344)			(10.486)			(4.400)
Log P. C.	0.182	0.182	0.183	12.947	12.988	12.983	-0.804	-0.808	-0.809
Expenditure	(15.311)	(15.360)	(15.384)	(80.735)	(81.005)	(80.956)	(6.987)	(7.029)	(7.037)
R-Squared	0.019	0.019	0.019	0.277	0.277	0.277	0.186	0.186	0.186

Notes: T-statistics calculated with robust standard errors clustered at the state level in parenthesis. All estimates include occupation, year and state dummies. Other explanatory variables include controls for household characteristics, characteristics of the household head, and household composition as in Table 4.2. Total sample size is 600618 for baby food and milk, and 452853 for education items.

Table 4.8: Engel Curves of Sex-Specific Goods Budget Shares

	Female Goods			
	Sari	**Chaddor**	**Toiletries**	**Jewellery**
	(1)	**(2)**	**(3)**	(4)
Log P. C. Expenditure	2.313	0.073	-0.029	-0.851
	(11.099)	(1.729)	(1.263)	(5.831)
Log P. C. Exp Squared	-0.014	0.010	-0.022	0.107
	(0.710)	(2.600)	(11.572)	(7.753)
Log Household Size	0.690	0.068	-0.213	0.141
	(17.962)	(9.115)	(61.928)	(11.516)
Sex of Head	-0.081	-0.009	0.098	-0.026
	(1.166)	(0.654)	(15.814)	(1.490)
Age of Head	-0.008	-0.001	0.002	-0.002
	(5.179)	(0.615)	(15.709)	(4.236)
Education of Head	-0.126	-0.014	0.035	-0.025
	(15.710)	(7.629)	(49.671)	(9.584)
Marital Status of Head	0.077	-0.006	-0.013	0.013
	(1.873)	(0.663)	(3.342)	(1.393)
Land Ownership	0.128	0.028	0.005	0.006
	(3.483)	(4.018)	(1.608)	(0.717)
Scheduled Caste/Tribe	0.173	0.036	-0.057	0.059
	(5.375)	(4.768)	(17.291)	(6.885)
Rural Dummy	0.426	0.059	-0.020	0.068
	(9.426)	(6.806)	(4.723)	(6.990)
Constant	-10.287	-0.821	2.072	1.385
	(17.594)	(6.906)	(29.566)	(3.549)
R-squared	0.179	0.048	0.136	0.014

Notes: T-statistics calculated with robust standard errors clustered at the state level in parenthesis. All estimates include occupation, year and state dummies. Other explanatory variables include controls for household demographic structure as noted in the text. Sample size is 600618 for toiletries, 313470 for sari and chaddor, and 298200 for jewelry.

Table 4.8 Cont: Engel Curves of Sex-Specific Goods Budget Shares

	Male Goods		
	Dhoti	**Lungi**	**Toiletries**
	(1)	**(2)**	**(3)**
Log P. C. Expenditure	1.558	0.648	-0.089
	(27.157)	(17.552)	(14.693)
Log P. C. Exp Squared	-0.108	-0.046	0.006
	(20.838)	(13.470)	(11.641)
Log Household Size	0.106	0.071	-0.002
	(7.737)	(8.351)	(2.125)
Sex of Head	-0.267	-0.055	-0.012
	(13.222)	(4.098)	(6.878)
Age of Head	0.001	-0.002	0.001
	(1.037)	(7.183)	(13.700)
Education of Head	-0.067	-0.030	0.016
	(25.361)	(15.965)	(69.126)
Marital Status of Head	0.037	0.012	-0.005
	(2.297)	(1.206)	(3.654)
Land Ownership	0.123	0.013	-0.003
	(10.722)	(1.625)	(2.875)
Scheduled Caste/Tribe	0.043	-0.005	0.009
	(3.551)	(0.616)	(9.269)
Rural Dummy	0.208	0.068	-0.037
	(15.571)	(6.709)	(28.018)
Constant	-5.653	-1.874	0.321
	(31.786)	(16.943)	(17.786)
R-squared	0.081	0.122	0.127

Notes: T-statistics calculated with robust standard errors clustered at the state level in parenthesis. All estimates include occupation, year and state dummies. Other explanatory variables include controls for household demographic structure as noted in the text. Sample size is 600618 for toiletries, and 313470 for dhoti, and lungi.

Table 4.9: Effect of Prohibition on Sex-Specific Goods Budget Shares

	Sari			Chaddor		
	(1)	(2)	(3)	(4)	(5)	(6)
Complete Prohibition	1.528	1.609		-0.226	-0.233	
	(6.605)	(7.045)		(7.171)	(7.256)	
Partial Prohibition		0.282			-0.024	
		(3.548)			(2.591)	
Arrack Prohibition			0.716			-0.092
			(8.122)			(6.841)
Log P. C. Expenditure	2.229	2.224	2.272	0.086	0.086	0.078
	(10.671)	(10.649)	(10.901)	(2.029)	(2.040)	(1.857)
R-Squared	0.180	0.180	0.179	0.048	0.048	0.048
	Female Toiletries			**Jewellery**		
	(7)	(8)	(9)	(10)	(11)	(12)
Complete Prohibition	-0.070	-0.112		0.026	0.015	
	(6.746)	(10.366)		(1.797)	(0.878)	
Partial Prohibition		-0.138			-0.041	
		(13.836)			(1.464)	
Arrack Prohibition			-0.129			-0.015
			(15.440)			(0.713)
Log P. C. Expenditure	-0.029	-0.038	-0.038	-0.853	-0.852	-0.850
	(1.263)	(1.702)	(1.673)	(5.841)	(5.832)	(5.820)
R-Squared	0.137	0.138	0.138	0.014	0.014	0.014

Notes: T-statistics calculated with robust standard errors clustered at the state level in parenthesis. All estimates include occupation, year and state dummies. Other explanatory variables include controls for household characteristics, characteristics of the household head, and household composition as in Table 4.2. Total sample size is 600618 for toiletries, 313470 for sari and chaddor, and 298200 for jewelry.

Table 4.9 Cont: Effect of Prohibition on Sex-Specific Goods Budget Shares

	Dhoti			Lungi		
	(13)	**(14)**	**(15)**	**(16)**	**(17)**	**(18)**
Complete Prohibition	0.069	0.095		0.186	0.189	
	(1.015)	(1.426)		(3.768)	(3.817)	
Partial Prohibition		0.092			0.012	
		(3.572)			(0.795)	
Arrack Prohibition			0.093			0.070
			(3.509)			(3.529)
Log P. C. Expenditure	1.554	1.553	1.553	0.638	0.638	0.644
	(27.074)	(27.038)	(27.046)	(17.325)	(17.314)	(17.452)
R-Squared	0.081	0.081	0.081	0.122	0.122	0.122

	Male Toiletries		
	(19)	**(20)**	**(21)**
Complete Prohibition	-0.014	-0.019	
	(5.029)	(6.979)	
Partial Prohibition		-0.018	
		(7.839)	
Arrack Prohibition			-0.018
			(9.671)
Log P. C. Expenditure	-0.089	-0.090	-0.090
	(14.695)	(14.903)	(14.911)
R-Squared	0.127	0.127	0.127

Notes: T-statistics calculated with robust standard errors clustered at the state level in parenthesis. All estimates include occupation, year and state dummies. Other explanatory variables include controls for household characteristics, characteristics of the household head, and household composition as in Table 4.2. Total sample size is 600618 for toiletries, 313470 for dhoti and lungi.

Table 4.10: F-Tests of Effects of Household Composition and Prohibition Interacted with Household Composition on Alcohol Budget Shares

Age-Group	Part A: Household Composition Level Effects Total Alcohol	Arrack	Toddy	IMFL	Beer
0-2	0.69 (0.41)	0.30 (0.59)	0.03 (0.87)	0.45 (0.50)	0.51 (0.48)
2-4	**5.53** **(0.02)**	2.03 (0.15)	**6.56** **(0.01)**	0.17 (0.68)	0.92 (0.34)
5-9	**6.80** **(0.01)**	2.08 (0.15)	**2.91** **(0.09)**	1.20 (0.28)	**5.33** **(0.02)**
10-14	0.70 (0.40)	0.01 (0.94)	**2.71*** **(0.10)**	0.11 (0.74)	**2.72** **(0.10)**
15-19	**3.10** **(0.08)**	1.39 (0.24)	**6.29** **(0.01)**	1.56 (0.21)	1.02 (0.31)
20-29	2.29 (0.13)	2.00 (0.16)	**2.97** **(0.09)**	0.01 (0.92)	3.06 (0.08)
30-54	**111.21*** **(0.00)**	**83.07*** **(0.00)**	**10.47*** **(0.00)**	**8.96*** **(0.00)**	**12.37*** **(0.00)**

Notes: Probability F>0 in parenthesis. Bold denotes significance over the 10% level. * denotes male coefficient greater than female; bold with no star implies female coefficient is greater than male.

Table 4.10 Cont: F-Tests of Effects of Household Composition and Prohibition Interacted with Household Composition on Alcohol Budget Shares

Part B: Household Composition and Prohibition Interaction Effects	**Total Alcohol**	**Arrack**	**Toddy**	**IMFL**	**Beer**
Complete Prohibition					
Female/Male Child	**5.57**	1.34	**8.15***	0.01	0.90
	(0.02)	(0.25)	**(0.00)**	(0.91)	(0.34)
Female/Male Adult	**3.03***	**5.32***	**3.77***	1.60	1.41
	(0.00)	**(0.00)**	**(0.00)**	(0.11)	(0.16)
Partial Prohibition					
Female/Male Child	0.09	0.00	0.67	0.40	0.72
	(0.77)	(0.95)	(0.41)	(0.53)	(0.40)
Female/Male Adult	1.09	**2.00***	**1.93***	**2.26***	1.32
	(0.28)	**(0.05)**	**(0.05)**	**(0.02)**	(0.19)

Notes: Probability F>0 in parenthesis. Bold denotes significance over the 10% level. * denotes male coefficient greater than female; bold with no star implies female coefficient is greater than male.

Table 4.11: F-Tests of Prohibition Interacted with Household Composition on Household Goods Budget Shares

	Food	Grains & Cereals	Pulses	Meat & Fish	Fruit & Veg	Dairy
Complete Prohibition						
Female/Male	1.80	2.63	1.54	0.76	0.61	1.22
Child	(0.18)	(0.11)	(0.22)	(0.38)	(0.43)	(0.27)
Female/Male	0.79	**6.20***	0.79	**4.53***	0.78	**4.11**
Adult	(0.43)	**(0.00)**	(0.43)	**(0.00)**	(0.44)	**(0.00)**
Partial Prohibition						
Female/Male	0.01	1.32	0.42	**4.09**	**3.75***	**3.60**
Child	(0.92)	(0.25)	(0.52)	**(0.04)**	**(0.05)**	**(0.06)**
Female/Male	1.47	**2.41***	**2.80**	**5.77**	**4.03**	**3.32**
Adult	(0.14)	**(0.02)**	**(0.01)**	**(0.00)**	**(0.00)**	**(0.00)**

	Fuel	Health Items	Education Items	Toiletries	Amuse-ment	Furniture
Complete Prohibition						
Female/Male	1.62	0.00	0.29	0.15	0.07	**2.76**
Child	(0.20)	(0.94)	(0.59)	(0.70)	(0.79)	**(0.10)**
Female/Male	**2.55***	0.26	1.56	**2.12***	0.36	0.48
Adult	**(0.01)**	(0.80)	(0.12)	**(0.03)**	(0.72)	(0.63)
Partial Prohibition						
Female/Male	2.31	1.82	**8.14**	0.63	2.35	1.32
Child	(0.13)	(0.18)	**(0.00)**	(0.43)	(0.13)	(0.25)
Female/Male	**4.44***	0.98	**1.97**	1.13	**5.37***	0.14
Adult	**(0.00)**	(0.33)	**(0.05)**	(0.26)	**(0.00)**	(0.89)

Notes: Probability F>0 in parenthesis. Bold denotes significance over the 10% level. * denotes male coefficient greater than female; bold with no star implies female coefficient is greater than male.

Table 4.11 Cont: F-Tests of Effects of Prohibition Interacted with Household Composition on Household Goods Budget Shares

	Utensils	Baby Food	Milk	Child Education	Male Toiletries	Female Toiletries
Complete Prohibition						
Female/Male	0.45	**4.61***	1.33	0.16	0.60	0.10
Child	(0.50)	**(0.03)**	(0.25)	(0.69)	(0.44)	(0.76)
Female/Male	**1.66***	**3.26***	**2.88**	0.01	**4.88***	**2.37***
Adult	**(0.10)**	**(0.00)**	**(0.00)**	(0.99)	**(0.00)**	**(0.02)**
Partial Prohibition						
Female/Male	0.88	2.47	**4.14***	**2.89**	0.02	0.12
Child	(0.35)	(0.12)	**(0.04)**	**(0.09)**	(0.90)	(0.73)
Female/Male	0.56	**2.93***	**4.22***	1.35	**4.91***	0.61
Adult	(0.58)	**(0.00)**	**(0.00)**	(0.18)	**(0.00)**	(0.54)

	Dhoti	Lungi	Sari	Chaddor	Jewelry
Complete Prohibition					
Female/Male	1.95	**3.10***	0.57	0.32	1.39
Child	(0.16)	**(0.08)**	(0.45)	(0.57)	(0.24)
Female/Male	0.82	**4.38***	**3.47**	**2.24***	1.04
Adult	(0.41)	**(0.00)**	**(0.00)**	**(0.03)**	(0.30)
Partial Prohibition					
Female/Male	0.27	0.01	0.04	**4.07***	2.59
Child	(0.60)	(0.96)	(0.84)	**(0.04)**	(0.11)
Female/Male	**2.55***	1.54	0.89	**5.74**	1.19
Adult	**(0.01)**	(0.12)	(0.37)	**(0.00)**	(0.23)

Notes: Probability F>0 in parenthesis. Bold denotes significance over the 10% level. * denotes male coefficient greater than female; bold with no star implies female coefficient is greater than male.

Table 4.12: Prohibition Interaction Effects on Broad Group Budget Shares

	Food	Grains & Cereals	Milk	Fuel	Education Items	Health Items	Clothing & Footwear	Amuse-ment
Complete* SC/ST Dummy	-1.192 (3.461)	-1.877 (8.084)	-0.523 (5.067)	-0.350 (5.497)	-0.007 (0.040)	-0.266 (2.108)	-0.419 (2.518)	-0.187 (8.798)
Partial* SC/ST Dummy	0.921 (3.642)	-1.813 (10.628)	0.595 (8.822)	-0.400 (8.281)	0.797 (6.402)	0.201 (1.852)	-0.355 (1.972)	0.042 (2.441)
Complete* Female Head	-0.275 (0.644)	-0.732 (2.953)	0.196 (1.563)	-0.373 (4.349)	-0.306 (1.335)	0.361 (1.591)	-0.037 (0.188)	0.008 (0.357)
Partial* Female Head	-0.120 (0.475)	-0.470 (2.946)	-0.178 (2.599)	-0.439 (8.260)	-0.043 (0.301)	0.080 (0.530)	0.283 (1.509)	-0.060 (3.993)

Notes: T-statistics in parenthesis

Table 4.12 Cont: Prohibition Interaction Effects on Broad Group Budget Shares

	Food	Grains & Cereals	Milk	Fuel	Education Items	Health Items	Clothing & Footwear	Amuse-ment
Complete*	0.050	-1.482	0.397	-0.350	-0.007	-0.266	-0.419	-0.187
Rural Dummy	(0.135)	(7.225)	(3.372)	(5.497)	(0.040)	(2.108)	(2.518)	(8.798)
Partial*	1.550	-0.309	-0.526	-0.400	0.797	0.201	-0.355	0.042
Rural Dummy	(6.048)	(2.118)	(7.460)	(8.281)	(6.402)	(1.852)	(1.972)	(2.441)
Complete*	0.003	1.268	-0.448	0.582	0.457	0.012	0.193	0.125
Literacy Dummy	(0.012)	(8.004)	(5.177)	(12.012)	(3.185)	(0.114)	(1.477)	(8.049)
Partial*	-0.226	1.098	0.210	0.588	-0.402	0.163	0.132	-0.056
Literacy Dummy	(1.257)	(10.150)	(4.022)	(16.841)	(3.759)	(1.689)	(0.956)	(4.244)

Notes: T-statistic in parenthesis

Table 4.13: GLS AR(1) Estimates of Prohibition on Private Negative Effects

	Cause of Death					Treated
	Accidents	Poisoning	Spurious Liquor	Liver Disease	Liver Cirrhosis	Liver Disease
	(1)	(2)	(3)	(4)	(5)	(6)
Complete Prohibition	-0.045	0.088	-1.278	0.172	-0.191	-0.041
	(1.017)	(1.178)	(2.257)	(1.972)	(2.223)	(0.400)
Lag Liver Disease Deaths				0.454		
				(8.325)		
Lag Liver Cirrhosis Deaths					1.039	
					(29.762)	
Lag Treated Liver Disease						0.581
						(11.922)
Proportion Urban Population	7.533	6.338	5.203	0.666	9.140	-17.896
	(8.140)	(1.703)	(0.776)	(0.117)	(3.002)	(3.162)
Constant	7.457	4.356	2.882	2.400	-2.493	8.591
	(29.863)	(5.274)	(1.648)	(1.665)	(3.162)	(5.386)
Observations	480	480	237	311	173	311

Notes: Z-statistics in parenthesis. All estimates include year and state fixed effects.

Table 4.14: GLS AR(1) Estimates of Prohibition on Social Negative Effects

	Log Total Cases of:								
	Total Crime	Rape	Murder	Thefts	Burglary	Robbery	Dacoity	Kidnaps	Road Accident Deaths
	(1)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Complete Prohibition	-0.042	0.017	0.045	-0.002	-0.053	0.010	0.060	0.036	0.001
	(2.516)	(0.237)	(2.099)	(0.111)	(1.857)	(0.163)	(0.899)	(1.116)	(0.025)
Log Real Net State Domestic Product	0.034	-0.130	-0.127	0.062	0.132	0.134	-0.006	-0.053	
	(0.913)	(0.577)	(2.366)	(1.485)	(2.150)	(0.906)	(0.042)	(0.821)	
Log Total Population	1.284	-0.832	1.110	2.421	1.252	-1.336	-1.026	-0.309	
	(5.137)	(0.877)	(4.437)	(9.312)	(3.426)	(2.023)	(1.547)	(0.766)	
Police per 000 Population	-0.041	0.053	0.010	-0.022	-0.023	0.114	0.149	-0.035	
	(1.729)	(0.388)	(0.287)	(0.888)	(0.674)	(1.327)	(1.779)	(0.908)	
Proportion Urban Population									1.980
									(0.894)
Constant	-3.008	-3.742	-16.654	-5.499	19.071	16.686	9.354	-2.415	8.383
	(1.121)	(1.386)	(5.951)	(1.398)	(2.662)	(2.379)	(2.163)	(0.893)	(13.629)
Observations	564	564	564	564	564	564	564	564	480

Notes: Z-statistics in parenthesis. All estimates include year and state fixed effects.

Chapter 5

Conclusion

This thesis has contributed to the understanding of prohibition policy by examining the determinants and effects of prohibition in Indian states over 1957-2001.

Prohibition of alcohol has been a contentious policy tool in many countries, yet there has been limited research on what drives prohibition and the what the consequences of policy are, both on alcohol demand and on other markets. The analysis in Chapter 2 examined the causes of alcohol prohibition and, in doing so, attempted to add to the empirical literature on the economics of government regulation. The determinants of prohibition were estimated as a function of political economy variables, the negative effects associated with alcohol use, the extent of prohibition policies in other states, and the composition of state finances. The results indicate limited support for the helping hand view of government which assumes regulation occurs to correct market failures or errors in individual decision-making. The analysis provides strong evidence that prohibition policies are not systematically related to the negative effects of alcohol consumption, or other systemic variables which would suggest prohibition to be the most effective policy handle to curtail alcohol demand.

On the other hand, there is some evidence for the grabbing hand view of government regulation. Prohibition is found to be related positively with the electoral cycle and appears to be driven less by the preferences of the electorate and more of specific groups as in the tollbooth view of the state. Nevertheless, it is not easy to distinguish between the latter and the theory of regulatory capture based on the analysis presented. What can be deduced is that the alcohol industry has significant influence in deterring prohibition whose effect is

difficult to counteract by other groups, such as NGOs or anti-alcohol movements.

Complete prohibition, partial prohibition, and the prohibition of any alcohol type appears to be determined by similar factors. In particular, the results provide strong support that prohibition is used strategically by non-alcohol producing states to elicit central transfers. The impetus for this is politically motivated as politicians win votes by coalescing rural constituencies for prohibition with the promise of lower negative effects of alcohol and higher central finance. There is also strong indication that inter-state competition for central rents results in prohibition as states attempt to maintain existing central excise shares.

Chapter 3 addressed the issue of the effectiveness of alcohol prohibition in reducing alcohol consumption. It overcomes the data limitations of previous studies on prohibition by analysing alcohol consumption data from a series of household consumer-expenditure surveys. The analysis found that alcohol prohibition had differential effects on alcohol by type of prohibition enacted and liquor group. Complete prohibition reduced participation and consumption of arrack, IMFL and beer, although it increased consumption of toddy - the local home brew. While supply shifts resulted from complete prohibition, the main mechanism through which demand decreased was through demand shifts resulting from the higher fixed costs of consumption. On the other hand, during partial prohibition supply shifts dominated any decrease in demand due to fixed costs. In particular, partial prohibition decreased arrack, toddy and beer participation and led to an increase in IMFL demand as consumers substituted away from arrack towards its nearest substitute. This suggests that both complete and partial prohibition have important spillover effects on the consumption of other liquor types which may have to be controlled using alternative policy measures.

There are strong associations between alcohol and the addictive goods examined in Chapter 3. Estimates using prohibition as an instrument for alcohol consumption suggest that overall alcohol and tobacco, and alcohol and pan are complements. However, the direction of the relationship differs by alcohol type and tobacco item. In particular, bidis and leaf tobacco are a complement to arrack and toddy and a substitute to IMFL in both sectors. On the other hand, cigarettes are a strong substitute for all alcohol items in both

sectors. Pan appears to be complementary to arrack, toddy and beer but a substitute for IMFL. Consequently, as shown by the reduced-form estimates, prohibition had significant spill-over effects on the consumption of these items and is associated with a decrease in overall demand for tobacco and pan. Amongst tobacco items, prohibition decreased leaf tobacco consumption and increased cigarette and bidi consumption - the latter being a substitute for IMFL and complementary to toddy.

Chapter 4 examined the effect of alcohol prohibition on the negative effects associated with alcohol use by examining the changes in the intrahousehold allocation of resources, alcohol-related disease and death, and disaggregated crime rates. In doing so, it provides an empirical basis for assessing the claims of prohibitionists that alcohol prohibition has significant positive spillover effects. Prohibition was found to have a significant re-allocative effect on household expenditure patterns indicating, that the results on alcohol consumption were not due to underreporting[1]. In particular, prohibition increased food and fuel budget shares, the former mainly due to increases in consumption of pulses, fruits and vegetables, and dairy products. It also shifted resources towards amusement services, perhaps as a substitution for alcohol. On the other hand, prohibition decreased budget shares of education goods, household appliances and utensils, and household toiletries. These broad effects also hold for child goods where prohibition increased shares of baby food and milk but decreased child education expenditures. The reallocation of resources due to prohibition does not follow sex-lines, with both male and female clothing increasing and sex-specific toiletries decreasing. For most goods, the direction of change was in line with that predicted by theory.

Overall the estimated effects of prohibition on intrahousehold resource allocations are small on average, as expected given the small share of alcohol in the household budget. This is not to say, however, that the associated welfare effects, at the household and societal level, are also small. While the analysis cannot infer whether household welfare increased or decreased due to the changes in the household bundle, the implication is that the welfare

[1]Given the significant negative effects on budget shares of some household items due to prohibition, underreporting, in the sense that items are declared missing or less than actually spend, is not endemic in driving the results. As discussed, the incentive for underreporting related to prohibition in household consumption-expenditure surveys is limited but its absence cannot be guaranteed.

effects on other individuals within the household could be significant. This is particularly important if consumption is constrained at unsustainable levels prior to prohibition.

The analysis on alcohol related deaths and disease found prohibition to have a significant negative effect on spurious liquor and liver cirrhosis deaths. Prohibition also had an estimated effect on alcohol-related social externalities by decreasing the incidence of crime in general, and burglaries in particular. However, prohibition is associated with higher liver disease deaths, perhaps due a greater incidence of poisoning. There was also an increase in homicide rates similar to increases found for the US during prohibition.

The finding that prohibition is enacted not with the explicit view to curtail alcohol demand for efficiency reasons but to fulfil the objectives of politicians and bureaucrats, raises serious questions regarding the role of the state in the economy. Given that paternalistic policies in general, and prohibition policies in particular, limit individual freedom by constraining individual choice, the above analysis provides good reasons to support a more limited role of government regulation. The observation that prohibition policies are not without their costs, such as greatly depleted state finances or larger bureaucracies, lends further credence to this view.

On the other hand, prohibition did significantly decrease alcohol consumption by approximately 26% for participation in alcohol. The finding that demand decreases, not only due to the increase in price resulting from the reduction in supply, but due to a deterrent effect of prohibition has several implications. First, it indicates that very high taxes would need to be implemented on production in order to achieve similar decreases in consumption via taxation. Secondly, it suggests that the design of alternative policies to prohibition should also focus on increasing the fixed costs of consumption, in addition to factors which affect price. These could include requiring consumers to purchase a liquor license, regulating the location of bars to be a suitable distance from the village/community centre, or limiting the number of retailers within a given area. Finally, the result indicates that prohibition causes a greater effect on consumption than estimated from the supply effect alone. The implication for the consumption of other prohibited goods such as drugs, is that lifting prohibition may result in a greater change in demand than expected from the price effect in isolation.

Aside from its effect on alcohol demand, prohibition had several spillover effects on the demand for other goods and the negative effects of alcohol use. As noted above prohibition decreased demand for complements to alcohol such as tobacco and pan, but increased consumption of substitutes such as bidis and cigarettes. Given that bidi and cigarette consumption is already high in India and that the associated negative health effects of increased tobacco consumption are substantial, this is a worrying side-effect. It also highlights the dangers of undertaking isolated policies to curtail alcohol demand, which exhibits strong associations with other harmful addictive goods, without incorporating measures to counter the unintended negative spillover effects of policy.

Prohibition, by inducing a decrease in alcohol consumption, also changed intrahousehold resource allocations by increasing outlays on food and fuel. In addition, there is evidence of positive private health effects and social effects due to the decrease in total crime. Given that the positive effects are a function of alcohol consumption, the implication is that alternative alcohol policies which bring about similar decreases in alcohol demand will have similar side-effects. This is corroborated by the evidence on the relationship between alcohol taxes and the negative effects of alcohol use for developed countries. Nevertheless, it can be argued that prohibition may be more effective in curtailing consumption in some instances, such as inelastic alcohol demands and poor taxation systems.

Aside from effects induced by a fall in alcohol consumption, prohibition is also associated with other spillover-effects arising from the nature of the policy itself. In particular, the growth of black markets in liquor and the lack of legal channels for the enforcement of contract results in an increase in organised crime and associated violence. The supply of illegal liquor also increases the probability of alcohol poisoning and may result in a glamorization of alcohol consumption. There may also be wider effects on society such as a disregard for the law and a culture of hypocrisy as observed during the US National Prohibition.

Overall, prohibition is therefore not a panacea to the negative effects of alcohol use. Given the significant effects on the demand for other goods and associated health and crime effects, prohibition should not be viewed solely with respect to its impact on alcohol demand. Instead a more integrated approach is needed which incorporates alcohol policy with other

measures to control addictive consumption and the spillover effects on private health and criminal behaviour.

Chapter 6

Glossary

Alcohol cardiomypopathy: A type of heart disease in which the heart muscle is abnormally enlarged, thickened and/or stiffened. As a result, the heart muscle's ability to pump blood is impaired. When induced by excessive alcohol consumption the disease is called alcohol cardiomypopathy.

Alcoholic gastritis: A group of disorders that induce inflammatory changes in the gastric channels. Alcohol is one of its several determinants.

Alcoholic liver cirrhosis: Liver cirrhosis is scarring of the liver that involves the formation of fibrous tissue associated with the destruction of the normal architecture of the organ. It is the result of long-standing injuries to the liver, most commonly due to alcohol use and/or particular types of hepatitis.

Alcohol polyneuropathy: A group of conditions which affect the functioning of the nervous system often induced by excessive alcohol consumption.

Arrack: Also known as country liquor. An unrefined distilled spirit, generally made from locally available raw materials such as sugarcane, molasses, rice, or coconuts.

Beer: any alcoholic drink fermented from grain.

Bhang: A drug similar to hash

Bidi: Bidis are an indigenous variation on cigarettes and comprise of a tendu leaf to contain the tobacco.

Block: See also taluk. For some Indian states blocks are synonymous with thaluks, in others it is an administrative division below the thaluk.

Chaddor: A cloth used as a head covering (and veil and shawl) by Muslim and Hindu women

Country liquor: See arrack

Dacoity: A form of robbery by groups of bandits (similar to highway robberies).

Dhoti: A long loincloth worn by Hindu men.

Ethanol toxicity: Poisoning due to overconsumption of ethanol.

Haemorrhagic stroke: The breakage or blow-out of a blood vessel in the brain resulting in high blood pressure and bleeding within the brain.

Indian Made Foreign Liquor (IMFL): Alcohol items such as whisky, gin and rum, formally produced in large distilleries

Leaf Tobacco: Shredded tobacco, usually untreated.

Lungi: A long piece of brightly coloured cloth (cotton or silk) used as clothing (a skirt or loincloth or sash etc.) by men in India.

Methanol toxicity: Poisoning due to overconsumption of methanol.

Neera: See toddy

Pan: Pan is the indigenous term for betel leaf.

Pancreatitis: Inflammation of the pancreas resulting in malfunction.

Sari: a dress worn by women consisting of several yards of light material that is draped around the body

Tahsil/Taluk/ Tehsil: An administrative division in India below a district; called tahsil/tehsil in northern India.

Toddy: Fermented palm liquor generally home-brewed. Also known as neera.

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