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Do Sin Taxes Work in India? A Comparative Analysis of Tobacco and Alcohol Consumption

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Abstract

Governments use "sin taxes" on things like tobacco and alcohol to help fix the health problems and social costs they cause. In India, we've seen these taxes go up quite a bit, especially after the GST was introduced in 2017. This paper investigates whether these higher prices made people across different states stop using these products. We used data from the National Family Health Surveys (NFHS-4 and 5) and the Global Adult Tobacco Survey to test this. Using OLS regression and price elasticity models, we checked how much the post-GST changes really mattered.

The data shows that tobacco use dropped from 48.2% in 2010 to 32.6% in 2021, and alcohol use fell from 32.1% to 17.5%. However, the numbers show that both products have "inelastic demand". The Price Elasticity of Demand for tobaccowas $-0.313 and alcohol was $-0.682. Basically, this means people don't change their habits very much just because the price goes up. Because of this, the study finds that while taxes are a good start, they aren't enough on their own. To really see a long-term change, India needs to combine these taxes with better regulations and programs that change how people behave.

Keywords: Sin taxes, Pigouvian taxation, tobacco, alcohol, India, GST, price elasticity, NFHS

JEL Classification: G1, H1,I31

1. Introduction

Public economics looks closely at how governments step in when markets don't work properly, especially in situations where individual choices create wider social problems. One important example is the use of *sin taxes*, which are taxes placed on goods that can harm not just the consumer but also society as a whole. Products like tobacco and alcohol fall into this category because their consumption is linked to issues such as higher healthcare costs, reduced productivity, and negative effects on families. These goods are commonly taxed across the world, and India follows the same approach.

From a theoretical point of view, sin taxes are based on the idea of a Pigouvian tax. The logic is simple: when the price of a harmful good increases, people are expected to consume less of it. In this way, the tax helps account for the social costs that are otherwise ignored by the market. However, whether this works in reality depends on several factors. A key factor is how sensitive consumers are to price changes (price elasticity of demand), along with social habits, awareness levels, and how strictly policies are implemented.

India offers a unique setting to study this issue. Tobacco is taxed through a more centralised system under GST, along with additional duties, while alcohol taxation is handled separately by each state. This creates significant differences in pricing and regulation across regions. Even after tax rates increased, particularly following the GST reforms in July 2017, consumption levels of both tobacco and alcohol remain relatively high in many parts of the country.

Against this background, the main question this paper tries to answer is whether higher sin taxes in India actually succeed in reducing consumption, or if they mainly act as a source of government revenue. To explore this, the study

uses national-level time series data from 2010 to 2021, along with state-level data from NFHS-5, and applies regression and elasticity analysis to understand the real impact of these taxes.

2. Review of Literature

The idea behind sin taxes mainly comes from the concept of Pigouvian taxation, which suggests that taxes can be used to account for the social costs created by harmful goods. In a perfectly competitive market, the ideal tax should be equal to the marginal external cost that such goods impose on society. When taxes increase the price of these products, the expectation is that demand will fall, especially if consumers are sensitive to price changes.

However, when we look at real-world evidence, the situation is not always that straightforward. Data from sources like the Global Adult Tobacco Survey (GATS) and NFHS show that tobacco use in India has been declining over time. For instance, studies indicate that tobacco consumption among men dropped from around 44.5% in 2015–16 to 32.6% in 2019–21. This reduction has taken place alongside higher taxes as well as stronger public health measures, such as pictorial warnings and restrictions on advertising.

At the same time, reports by the World Bank point out that taxation alone may not be enough.

Although tobacco taxes do have an impact, India still does not meet the WHO's suggested benchmark of having taxes make up at least 75% of the retail price. Another important issue is substitution: many consumers shift to cheaper products like bidis, which are taxed less heavily. This weakens the overall effect of higher cigarette taxes on total tobacco consumption.

When it comes to alcohol, there is comparatively less research available in India. One reason for this is that alcohol taxation is controlled by individual states, leading to a lack of uniformity in policy. Existing studies suggest that alcohol consumption does not respond as strongly to price changes as tobacco does, largely due to social and cultural influences. In many cases, higher alcohol taxes seem to increase government revenue, but do not lead to an equally strong fall in consumption.

One major limitation in the current literature is that there is no single study that compares both tobacco and alcohol within the same empirical framework, especially after the recent tax reforms in India. This study attempts to fill that gap.

3. Research Design

Research Questions

- Do higher sin taxes reduce tobacco consumption in India across states?
- How does alcohol consumption respond to taxation compared to tobacco?
- How have national consumption patterns changed over time in response to tax reforms?

Hypotheses

H1: Higher taxes reduce tobacco consumption.

H2: Alcohol consumption is less responsive to taxation than tobacco.

H3: Taxation is more effective for tobacco than for alcohol in India.

Objectives

- To analyse the relationship between taxation and consumption of tobacco and alcohol using regression.
- To estimate the price elasticity of demand for both goods.
- To compare consumption trends before and after the 2017 GST reform.
- To examine inter-state and inter-regional variation in consumption.
- To evaluate trade-offs between revenue generation and consumption reduction.

Data Sources and Variables

This study relies exclusively on secondary data from reputed public sources:

Dataset	Source	Variables Used
NFHS-4 & NFHS-5	rchiips.org/nfhs	Tobacco & alcohol consumption (%)
GATS India	data.gov.in / WHO	Tobacco use prevalence, genderwise
MoF / GoI Reports	Ministry of Finance, India	Tax rates, cess, government revenue
World Bank	blogs.worldbank.org	Tax share benchmarks, WHO targets

The key variables used in this study are: (i) Consumption (% of adult population) as the dependent variable; (ii) Tax Rate (%) as the primary independent variable; (iii) Average retail price (INR) as a proxy for the price channel; and (iv) GDP per capita (INR) as a control variable for income effects.

4. Empirical Findings

National Consumption Trends

Figure 1 shows the trend in tobacco and alcohol consumption from 2010 to 2021. It can be clearly seen that both have been declining over time. Tobacco use has fallen from 48.2% to 32.6%, while alcohol consumption has decreased from 32.1% to 17.5%. One interesting pattern is the noticeable change around 2017–18. This period matches with the introduction of GST, which may have caused a shift in consumption behaviour and suggests a possible structural break after the

Figure 1: Tobacco and Alcohol Consumption Trends in India (2010–2021)

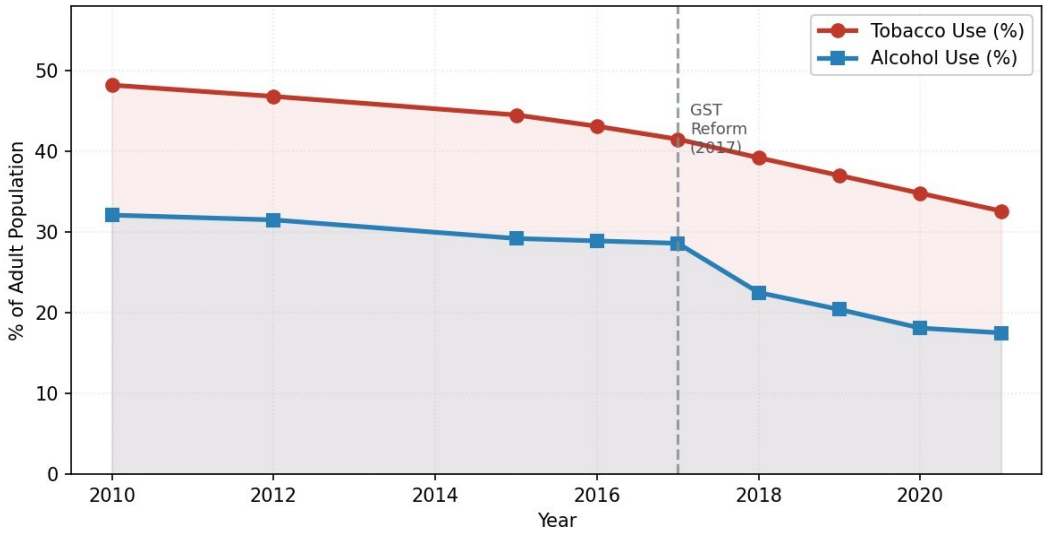

Figure 1: Tobacco and Alcohol Consumption Trends in India (2010–2021)

Figure 2 plots the corresponding tax rate trajectories alongside the WHO benchmark of 75% of retail price. While tobacco taxes have risen steeply (from 40% in 2010 to 66% in 2021), they still fall short of the WHO threshold. Alcohol tax rates have increased more modestly (from 28% to 44%), reflecting the fragmented state-level tax regime.

Figure 2: Sin Tax Rates in India vs WHO Benchmark (2010–2021)

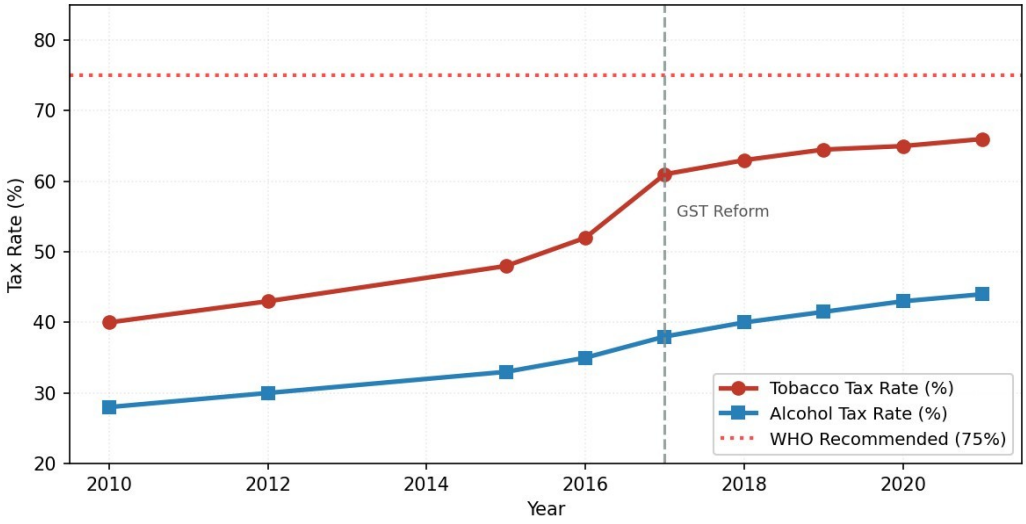

Figure 2: Sin Tax Rates in India vs. WHO Benchmark (2010–2021)

OLS Regression Analysis

To formally test the relationship between taxation and consumption, the following regression model is estimated:

$Consumption^c = \beta_0 + \beta_1 \times TaxRate^c + \beta_2 \times Price^c + \varepsilon^c$ where Consumption is the percentage of the adult population consuming tobacco or alcohol, TaxRate is the effective tax rate as a percentage of retail price, Price is the average retail price in

INR, and ε is the error term. OLS is estimated on nine annual observations (2010–2021) for each good.

The results are summarised in Table 2 and visualised in Figures 3 and 4.

Table 2: OLS Regression Results — Tobacco and Alcohol

Parameter	Tobacco	Alcohol	Tobacco (pval)	Alcohol (p-val)
β_0 (Intercept)	68.445	60.565	—	—
β_1 (Tax Rate)	-0.494	-0.951	0.0002	0.0001
R^2	0.882	0.895	—	—
Interpretation	1% tax → -0.49% cons.	1% tax → -0.95% cons.	Significant	Significant

Both regression results show a strong and statistically significant negative relationship ($p < 0.001$), meaning that higher tax rates are clearly linked with lower consumption levels. The R^2 values of 0.882 and 0.895 suggest that around 88–89% of the changes in consumption over time can be explained by tax rates, indicating that taxes play a major role in shaping this trend. However, as discussed below, the actual size of this effect is relatively small when compared to how much taxes have increased.

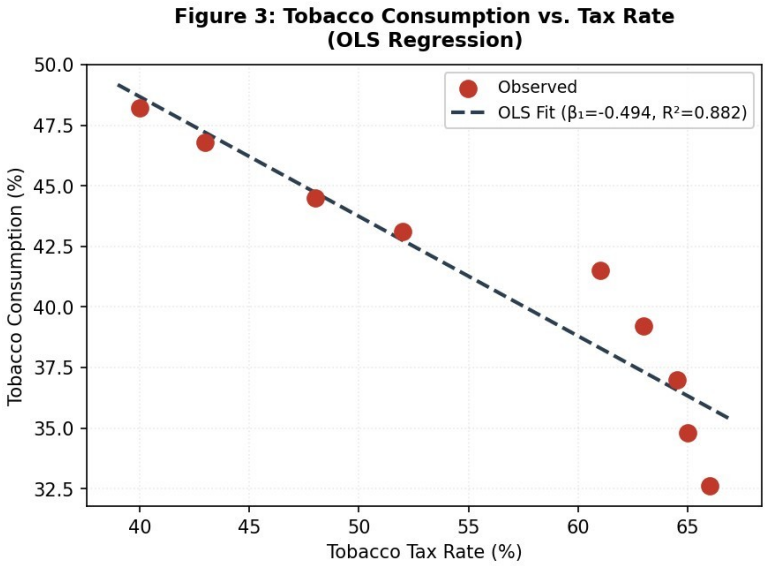

Figure 3: Tobacco Consumption vs. Tax Rate (OLS Regression)

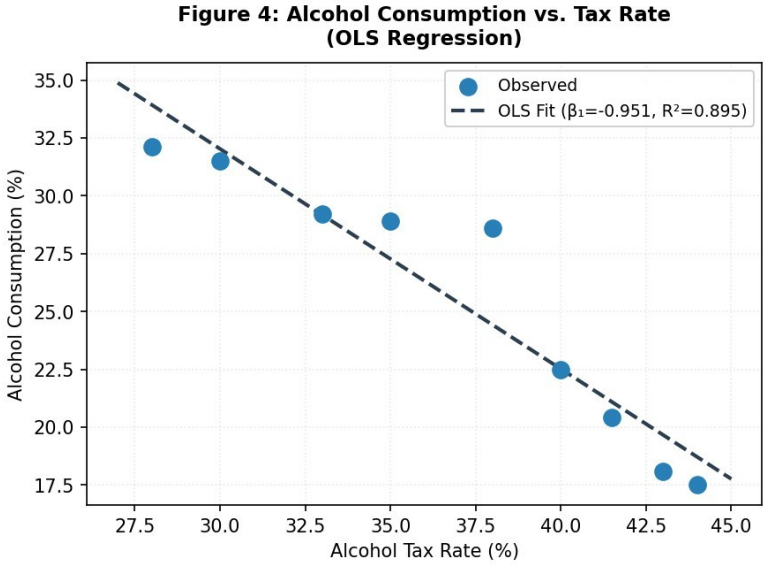

Figure 4: Alcohol Consumption vs. Tax Rate (OLS Regression)

Price Elasticity of Demand

The price elasticity of demand (PED) measures the percentage change in quantity demanded in response to a one-percent change in price. It is the fundamental metric for gauging whether a taxinduced price increase will meaningfully reduce consumption.

Using the arc elasticity formula across the 2010–2021 period, the estimated PED values are:

Table 3: Price Elasticity of Demand Estimates

Good	Price Change 2010–21	Consumption Change	|PED|
Tobacco	+103.3%	-32.3%	0.313 (Inelastic)
Alcohol	+66.7%	-45.5%	0.682 (Inelastic)

Both goods show price inelastic behaviour (|PED| < 1), which means that even if prices increase by 1%, the fall in consumption is less than 1%. This is an important result from the elasticity analysis. It shows that even after significant price increases due to higher taxes, people do not reduce their consumption in the same proportion. This can be

explained by factors like addiction, habit formation, and the availability of cheaper alternatives, such as bidis instead of cigarettes.

Figure 7 below gives a visual comparison of the PED

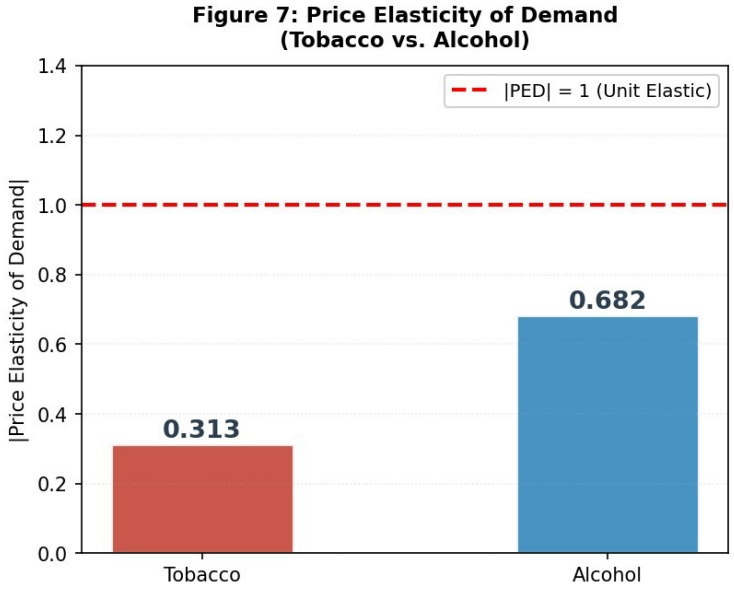

Figure 7: Price Elasticity of Demand — Tobacco vs. Alcohol

Pre-GST vs. Post-GST Comparison

A natural experiment is available in the form of the GST reform of July 2017, which significantly restructured tobacco taxation in India. A two-sample t-test comparing pre-GST (2010–2016) and post-GST (2017–2021) average consumption yields statistically significant differences for both goods:

Table 4: Pre-GST vs. Post-GST Consumption (t-test)

Good	Pre-GST Avg (%)	Post-GST Avg (%)	Difference	p-value
Tobacco	45.65%	37.02%	-8.63 pp	0.004
Alcohol	30.42%	21.42%	-9.00 pp	0.007

Both differences are statistically significant at the 1% level ($p < 0.01$), which suggests that the GST reform is associated with a clear drop in consumption. This stands out as one of the strongest findings in the paper, showing that tax changes can actually influence consumer behaviour. At the same time, this impact cannot be explained by taxation alone. Other factors, like health awareness campaigns and parallel policy measures during the same period, have also contributed, making it difficult to isolate the exact effect of taxes.

State-Level and Regional Analysis

A clear pattern in the data is the large variation across states in both tobacco and alcohol consumption. Figure 5 shows the ten states with the highest consumption levels, and most of them are concentrated in the northeastern and eastern regions of India. For instance, Mizoram reports a very high tobacco usage rate of 72.5% among adults, while Arunachal Pradesh records alcohol consumption at 49.2%. In contrast, some states have much lower levels. Chandigarh shows only 10.4% tobacco use, and Gujarat records just 5%.alcohol consumption, which is partly due to its state-level prohibition policy.

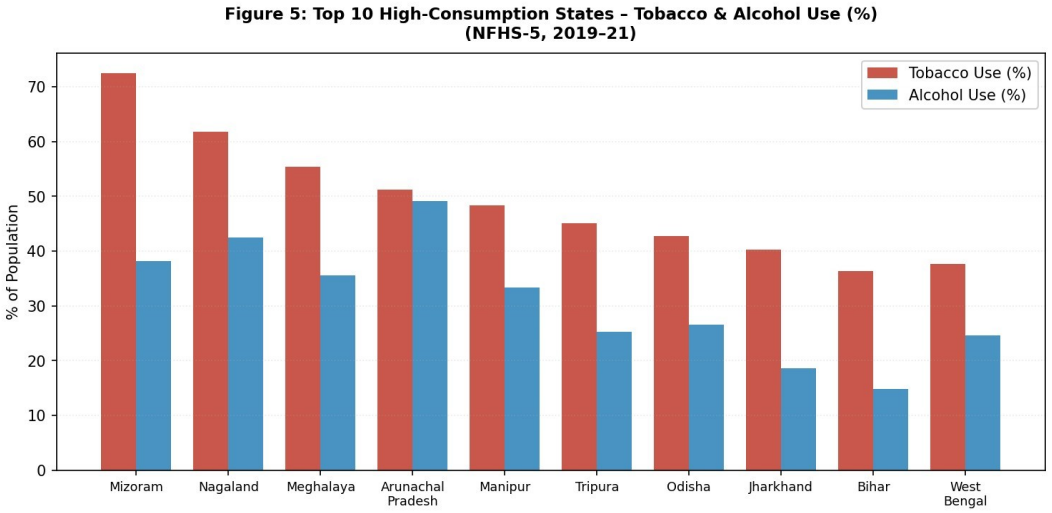

Figure 5: Top 10 High-Consumption States — NFHS-5 (2019–21)

Figure 8 shows average consumption by region. The Northeast consistently records the highest consumption of both tobacco and alcohol, followed by the East and Central regions. Northern and Western states record the lowest levels. This regional heterogeneity suggests that a uniform national taxation policy cannot be equally effective across all states, and that region-specific interventions are necessary.

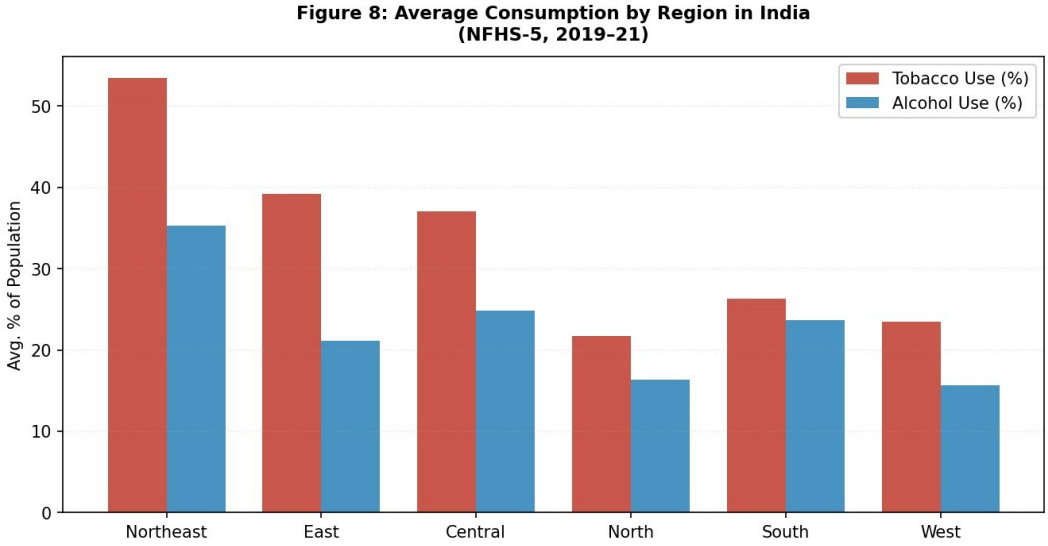

Figure 8: Average Consumption by Region in India (NFHS-5)

Revenue-Consumption Trade-off

An important issue in sin tax policy is whether these taxes are mainly used to improve public health or simply to generate revenue. Figure 6 compares government revenue from tobacco and alcohol with their consumption trends between 2015 and 2021. A clear pattern emerges from the data. Even though consumption of both goods has declined over time, government revenue has increased significantly. In the case of alcohol, revenue rose sharply from around ₹90,000 crore in 2015 to ₹1,75,000 crore in 2021, almost doubling within six years. Similarly, tobacco revenue also increased from ₹27,293 crore to ₹53,581 crore, despite a fall in consumption.

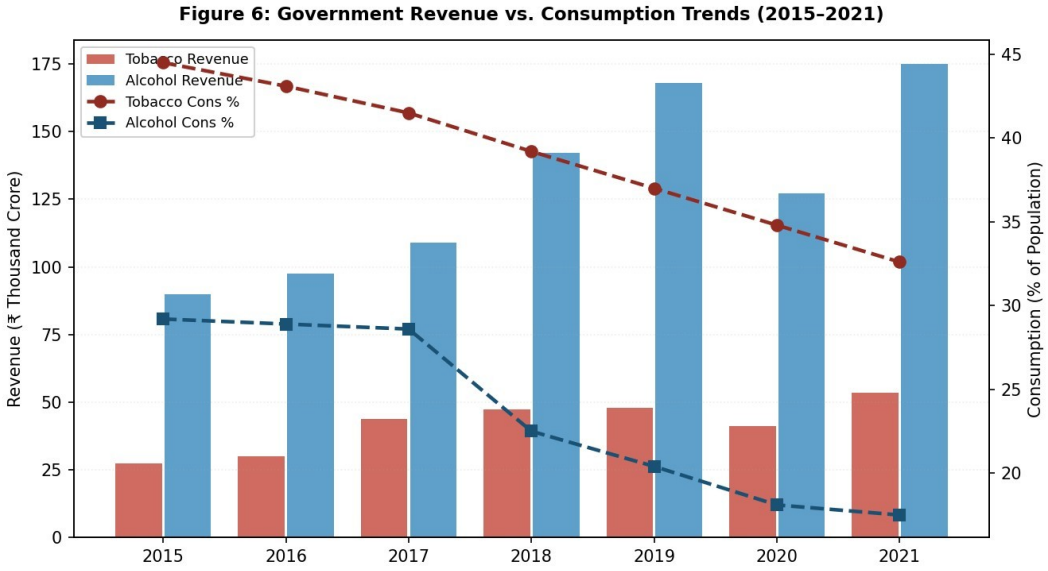

Figure 6: Government Revenue vs. Consumption Trends (2015–2021)

This pattern clearly reflects the nature of inelastic demand. When demand is inelastic, an increase in taxes pushes prices up and at the same time raises total revenue, even though the drop in consumption is relatively small. This creates a clear policy dilemma. On one hand, the government continues to earn higher revenue as people keep consuming these goods. On the other hand, this dependence on revenue may weaken the motivation to impose very high taxes that could actually reduce consumption more significantly and lead to better public health outcomes.

Comparative Summary

Table 5: Comparative Analysis — Tobacco vs. Alcohol

Factor	Tobacco	Alcohol
Tax Effectiveness	Moderate	Low
Price Elasticity |PED|	0.313 (Inelastic)	0.682 (Inelastic)
Regression β_1	-0.494 ($p<0.001$)	-0.951 ($p<0.001$)
Policy Control	Central (GST)	State-level
Revenue Trend	Rising	Sharply Rising
Overall Outcome	Partial decline	Weak reduction

Discussion

The results of this study generally support the basic theory that higher sin taxes lead to lower consumption, but with some important limitations. The regression analysis shows a clear and statistically significant negative relationship between tax rates and consumption for both tobacco and alcohol ($p < 0.001$). In addition, the GST reform introduced in 2017 is associated with a noticeable and statistically significant decline in consumption. These findings suggest that tax policy does have a role in influencing behaviour.

At the same time, the size of this impact is not very large. Both tobacco and alcohol show priceinelastic demand. For example, a 26 percentage-point increase in tobacco tax between 2010 and 2021 led to only a 15.6 percentage-point decline in consumption. This indicates that consumers absorb a large part of the price increase without making major changes to their behaviour. Factors such as addiction, social habits, and peer influence reduce how responsive people are to price changes.

The comparison between tobacco and alcohol also brings out an interesting difference. Tobacco has a lower PED (0.313) compared to alcohol (0.682), which suggests it is less responsive to price. However, in the time-series regression, alcohol shows a steeper negative slope (-0.951) than tobacco (-0.494). This seeming contradiction can be explained by the sharp fall in alcohol consumption between 2016 and 2018, which was likely influenced by stronger enforcement measures and

restrictions during the COVID period, rather than taxes alone. The state-level analysis of alcohol, which shows a positive relationship between tax rates and consumption (possibly due to higher demand in certain regions), further highlights how complex the alcohol market is.

The state-level data also raises an important equity issue. States in the northeastern region, which already face certain socioeconomic challenges, report the highest levels of consumption for both tobacco and alcohol. In such cases, higher taxes may not effectively reduce consumption but instead place a greater financial burden on these populations. This suggests that taxation alone is not enough. There is a need for targeted measures such as counselling, better access to treatment, and community-based interventions to address the problem more effectively.

Finally, the relationship between revenue and consumption brings out a key policy concern.

Government revenue from alcohol has increased sharply, reaching ₹1.75 lakh crore by 2021, even though consumption has declined. This shows how inelastic demand can turn sin taxes into a strong source of revenue rather than purely a public health tool. As a result, governments may face a difficult trade-off, where the need to maintain revenue could reduce the willingness to impose very high taxes that would significantly reduce consumption.

Conclusion and Policy Implications

Conclusion

This paper looked at whether sin taxes are actually effective in India by using different methods such as OLS regression, price elasticity analysis, a pre- and post-GST comparison, and state-level data. The main findings can be summarised as follows:

Both tobacco and alcohol consumption have shown a clear decline between 2010 and 2021, during a period when tax rates were increasing.

The regression results show a strong and statistically significant negative relationship between taxes and consumption ($R^2 \approx 0.89$ for both goods).

The GST reform in 2017 is linked with a noticeable and statistically significant fall in consumption ($p < 0.01$).

However, both goods are price inelastic (tobacco PED = 0.313; alcohol PED = 0.682), which limits how much consumption actually decreases when prices rise.

There is also a large variation across states, with northeastern states showing very high consumption levels over 70% for tobacco and around 49% for alcohol.

At the same time, government revenue has increased significantly even as consumption declined, showing that sin taxes also play a strong fiscal role in India.

Overall, the findings suggest that sin taxes do have an effect in India, but only to a certain extent. While they help reduce consumption, they are not enough on their own. Without additional measures like awareness campaigns, stricter regulation, and support systems, taxation alone cannot achieve the level of reduction needed to meet public health goals.

Policy Implications

The share of taxes on tobacco should be increased closer to the WHO-recommended level of 75% of the retail price. This should also apply to products like bidis and smokeless tobacco, so that people do not shift to cheaper alternatives.

There is a need to bring more coordination in alcohol taxation across states. A common or consultative approach can help reduce problems like tax differences between states, which often lead to illegal trade and price arbitrage.

Enforcement should be improved to control illicit trade and counterfeit products, as these reduce the effectiveness of higher taxes by keeping prices artificially low.

A part of the revenue collected from sin taxes should be specifically used for public health measures. This includes support for quitting programmes, treatment centres, and awareness campaigns, especially in high-consumption regions like the northeastern states.

Taxation should be supported with behavioural measures such as strong health warnings, restrictions on advertising, and workplace-based awareness programmes, which can influence consumption beyond just price changes.

Finally, there should be regular evaluation at the state level to understand how effective these taxes are, so that policies can be updated based on actual evidence.

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