Working paper

Distribution of the Commodity Tax Burden in Bihar

1994-2010

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Overview

Commodity taxes in India are under the constitutional jurisdiction of the states. A general concern with consumption tax systems is that they may be regressive, disproportionately burdening poorer households. Historically, state governments have adjusted the rates relatively often – out of distributional concerns, moral judgments and as a result of interest group pressure. The result has been a complicated system that gets more complicated each year. Occasionally the system is simpilfied by a sweeping reform, only to begin again the process of becoming more complicated. In our study period, this simplification occurred during the 2005 VAT reform, which also significantly reduced rates. The very complexity of the tax system has made answering even basic questions about the system difficult, and often neglected. We have created a new, comprehensive database of tax rate information and combined it with consumption data. The result allows us to examine the overall burden as well as the progressivity of the consumption tax systems in Bihar from 1994 to the present in a systematic way.

Over the study period tax rates have gotten significantly lower and the system somewhat more progressive. In 1994, despite the complexity of the sales tax system, implied tax rates were nearly identical for the richest and poorest households. If anything, rates were U-shaped with respect to total expenditure. The 2005 VAT reform reduced overall rates by 1-2 percentage points over the entire expenditure distribution, with much of the reduction concentrated among staple goods. Revenue increased slightly, perhaps due to a lower cost of compliance with a simpler system, and stronger enforcement. The reform also restored some progressivity to the system: in 2010, the poorest households paid about 3.7 and the richest about 4.9% in state consumption taxes. Middle-expenditure families paid slightly lower rates, at about 3.5%. The increasing progressivity can be attributed mostly to the changes to the tax code, and not other factors like rising incomes.

Data

For this project we collected tax data from two sources: Mahesh Purohit's *Structure and Administration of Sales Taxation in India* (hereafter Purohit) for 1994, and the commercial data vendor Instavat for 2000 onwards. The data is quite detailed – Purohit contains data on hundreds of categories of consumption (with some amalgamations and simplifications), and Instavat the full schedules and notifications produced by the state governments, often encompassing thousands of categories of goods. We combine this tax data with expenditure data from the National Sample Survey of India (NSS) for the years 1994 to 2010 (the last year available). The NSS has information on approximately 25,000 households in most years, and up to 125,000 in quinquennial "thick" years. Each round contains information on a number of demographic factors, including family size and structure,

religion and caste, and age, education, occupation and marital status for each household member. Most importantly, it contains household-level consumption information for hundreds of categories. Fortunately for our purposes, many of the NSS expenditure categories are similar to the commodity definitions used by state tax officials.

Even once we had out data in hand, collecting, cleaning and organizing it for analysis was a significant undertaking – for many states, including Bihar, there are nearly 100 categories that can be concorded with NSS expenditure data. The resulting level of granularity in the combined dataset, however, allows an unprecedented analysis of the incidence and distribution of the state tax burden in Bihar and how it has evolved over time.

We note that our analysis here focuses on state taxation, and omits several indirect taxes. Due to lack of data in the early years, we omit analysis of the Central VAT (formerly the MODVAT). This Central VAT is a federal excise on the production of all goods in India. The current rate is high — 10.3% — but applies to the relatively small base of producers. In 2010, the total revenue from federal excise taxes was only 27% of the revenue from indirect taxes (Government of India, 2011; author's calculations). Customs duty is omitted for the same reason. We do, however, include the federal service tax in our calculations. Those interested specifically in the Central VAT can find analysis that accounts for it in 2010 in our accompanying memo, *Rates, Redistribution and the GST*, where we include it to allow for comparison with the GST, which would subsume all other indirect taxes.

Calculating the Tax Burden and Tax Progressivity

Tax Rates and Implied Tax Burdens

Table 1 presents tax rates for a number of commodities from 1994 to 2010. A more detailed analysis of the evolution of tax rates is included in the accompanying memorandum *Commodity Taxation in Bihar, 1994-2012*. The most salient points for our analysis here is that rates have been generally lowered and simplified over the study period, with the prominent exceptions of petrol and country liquor. Over the study period, staple goods have generally been taxed at lower rates. Readymade clothing and hosiery goods are both taxed at 4%, while cotton, which includes more basic clothes, is tax exempt. Household durables are generally taxed at higher rates, as are vehicles and some forms of technology. Similar built-in progressivity can be observed even within consumption categories like food, particularly before the 2005 VAT reform. Rice, fruits and vegetables, milk, meat and fish were all taxed at less than 4%, while relative luxuries like spices, sweets and processed foods were taxed at higher rates. Despite the lower tax rates for many goods, the general rate, which is called the revenue neutral rate after 2004, is higher after the VAT reform – 12.5%, rather than 8%.

To calculate implied tax rates by household, we first match commodity-specific statutory tax rates from Purohit and Instavat to commodity-specific consumption categories in the NSS. For the Purohit data we match 82% of expenditure with a tax rate, and the rest is assumed to fall under the general rate. For the Instavat data, we match 84% before the VAT reform, and 87% afterwards.

We then apply this statutory rate to expenditure categories. For example, if a household spends 300 Rs. on spices in a year, and the tax rate on spices is 9%, we assume that the amount of tax is 300*9/109 = 24.8 Rs. We then do the same for each consumption category and aggregate to the level of the household. These calculations make implicit assumptions about (1) the economic incidence of taxes; (2) tax compliance; and (3) the level of home production.

Economic Incidence

The economic incidence of a tax is a measure of how much of the burden of tax falls on different parties. The incidence on consumers can be understood as the difference in price between what the consumer is paying and what they would pay in the (unobserved) situation where the good was untaxed. Although a tax will likely raise the price that the consumer pays, it may not raise the price the by full amount of the tax. True economic incidence depends on the elasticities of supply and demand, may vary across goods, and is notoriously difficult to measure. In this analysis, we follow a fairly standard assumption that incidence of sales and excise taxes is fully on consumers (Fullerton and Metcalf, 2002). Existing research has found results consistent with full shifting of tax burdens to consumers for sales taxes (Besley and Rosen, 1998; Poterba, 1996), gasoline taxes (Chouinard and Perloff, 2004), and cigarette taxes (Harding et al, 2010). However, studies for developing economies are limited. It is important to note that if the incidence of these taxes is not fully on consumers, our estimates of consumer tax burdens will be overstated, and our analysis of progressivity may be biased if incidence differs for goods disproportionately consumed by rich and poor households.

Tax Compliance

It is well known that there is considerable tax evasion in India. The very complexity of the system allows for fraud – for example, the same commodity is often taxed at a different rate depending on who is purchasing it – and poor record-keeping makes enforcement more difficult. Low-turnover dealers are exempt from paying tax, causing many stores to falsely claim that they are tax-exempt.

For the purposes of our analysis, we assume that all purchases are eligible to pay tax. Unfortunately, the NSS does not contain sufficient information to determine the turnover of the store where the item was purchased, and we know of no alternative source of data to construct an estimate of the extent to which higher-income households make purchases from higher-turnover stores. To the extent that households are not paying the full statutory tax on all consumption, we will overestimate implied tax burdens. Low levels of tax compliance could also affect our progressivity analysis if compliance varies systematically with income. We suspect that in fact this *is* the case – low income households are more likely to make purchases from smaller stores or from individuals, both of which are less likely to report the sale to the tax authorities even if their turnover is large enough to warrant tax payment. If this is the case, we will understate the effective progressivity of the system.

Home Production and Income

Most households are involved in some sort of home production, varying from making ghee or growing vegetables to producing small household items like candles and matches. Consumption out of home production is not taxable, and varies systematically with expenditure. The overall rate of home production fell nearly in half between 1994 and 2010, from 32% to 16% of the value of consumption, but the overall pattern stayed much the same. In urban areas, home production is flat with respect to total expenditure, at about 16% in 1994 and 4% in 2010. In rural areas, however, home production increases substantially with expenditure, from 1.5% for the poorest decile to 28% for the eighth decile. The stark rural differences can be attributed less to expenditure itself, but amount of land owned, which increases the scope for home production. Moving from the poorest decile to the top decile of expenditure increases home production by only 1 percentage point; owning any land increases home production by 16 percentage points.

The NSS does, however, contain information on whether the item was purchased from a store or produced at home in certain years. In Figure 1, we construct estimates of the tax rates for different deciles of income in 2010 under two scenarios: 1) that all expenditure is taxed at the statutory rate, and 2) that home consumption is not taxed. The effect is almost unnoticeable. Although there is substantial home consumption, it almost all takes place for exempt or low-tax goods: rice and rice products, milk, and firewood and other fuels. In earlier years, when these commodities were not exempt, there is a large gap between the two scenarios. Figure 2 shows the same calculations for 1994. The gap is large, with a median of a little over 1 percentage point. However, it is nearly constant over the length of the consumption distribution.

Results

Tax Levels and Overall Progressivity

Figure 1 allows us to assess the overall tax burden on households as well as the current implied progressivity of the commodity tax system. Across the expenditure distribution, the implied average tax rate is 3.4% in 2010. This rate is essentially constant (perhaps even slightly U-shaped) through the eighth decile: the implied rate for the lowest decile is 3.3% and 3.4% for the eighth decile, with very slightly lower rates in between. The implied rates for the top two deciles are 3.8% and 4.4% respectively. The purchase-only rates are identical except for in the lowest decile, where the rate is 3.2% rather than 3.3%.

Figure 2 illustrates that the commodity tax system is now more progressive, particularly at the high end of the income distribution, than it was in 1994. We next turn to an analysis of the extent to which the change in progressivity from 1994 to 2010 was driven by the 2005 VAT reform, versus other factors such as changing home production or income patterns.

VAT Reform and Effects on Progressivity

In order to assess the effects of the VAT reform, we compare data from 2004 (the last pre-VAT year) and 2010. A first challenge in this analysis is that the 2004 NSS unfortunately does not separate purchases from home production. Table 2 presents implied tax rates for 2004 and 2010, assuming all expenditure in 2004 was taxed. This comparison suggests that effective rates came down substantially and progressivity increased over the period. However, if the 2004 home production gap was the same size as 1994 home production gap, that would imply that purchase-only rate for 2004 was about the same as the 2010 conventional rate, and that the difference in observed 2004 and 2010 rates was due mostly to overstating the 2004 rate.

A second challenge is changes in the income distribution over time. As households become richer, they tend to buy more non-necessities. Since the tax system is explicitly designed to tax luxury goods at a higher rate, economic growth could change the shape of the tax curve. *A priori*, there is no reason to believe that increasing income would either increase or decrease the progressivity of the tax system. Since *more* luxurious goods tend to be taxed at ever larger rates, the change in the tax code depends on several factors: the current shape and evolution of the income distribution, and the marginal propensities to consume at different points in the income distribution.

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We argue that the observed increase in progressivity is not primarily driven by changing home production or income patterns. Figure 3 shows the rates for 2010 given in Figure 1 as well as the implied rates for 2004 from Table 2 assuming all 2004 expenditure is taxed. We then construct two counterfactuals using 2010 expenditure data but assuming that the 2004 rates applied in 2010. This allows us to estimate the extent to which changes in progressivity are due to changes in the *rate structure* as opposed to other confounding factors. Note that this is a simplified experiment -- had the 2004 tax code not changed, prices would be different and household would choose a different bundle of goods. However, such first-order work can be instructive, and for relatively small price changes is likely to be close to the result obtained from a more involved model.

Figure 3 illustrates the two counterfactual cases: "Rate, Purchase Only 2010 Counterfactual" applies the 2004 rates to 2010 expenditure, allowing for non-taxed home production in 2010. "Rate, 2010 Counterfactual" applies the 2004 rates to 2010 expenditure, assuming (as we did for 2004) that all expenditure is taxed. Both counterfactuals illustrate the same overall flat / slightly U-shaped pattern of tax rates that we see in 2004, providing supporting evidence that the increase in progressivity was due primarily to changes in the rate structure under the reform.

Several components of the reform were likely to have been particularly important in driving the change in progressivity. The high implied tax rate for poor households in 2004 was principally due to the high tax on edible oils and firewood, both of which made up large expenditure shares. By 2010, poor households were spending a slightly smaller fraction of their income on the two commodities; more importantly tax rates had been slashed for both commodities. At the top end, another important factor in increasing progressivity was drastically increasing fuel and liquor taxes, as well as a higher revenue neutral rate. Although high-expenditure households benefited significantly from reduced staples taxes, they bear most of the burden of higher alcohol and fuel taxes, and much of the revenue neutral rate burden. Fuel and liquor make up 2 and less than 0.5% of consumption, respectively, but are responsible for an outsize share of revenue *implied by our consumption data*: 6.5 and 1.6%, respectively. This revenue came almost entirely from the top few deciles.

The effect of the reform on tax levels is slightly less clear. Since do not observe home production for 2004, the purchase-only tax rate is not directly calculable. However, by comparing the gap for 1994 and 2010, we can provide a range for the home production gap and estimate bounds for the 2004 purchase-only rate. Since tax changes are modest for high-home production goods between 1994 and 2004, the home production gap implied by the difference between the two counterfactuals in Figure 3 can be compared to the home production gap from 1994. The home production gap decreases significantly between 1994 and 2010, from 1.1% to 0.3% of expenditure (all numbers for the fifth decile). The 2004 home production gap ostensibly lies somewhere between these two values, implying a purchase-only 2004 rate of between 3.8% and 4.6%. If the change in the home production rate was linear, the 2004 purchase-only rate would be 4.3%. In any case, the unknown 2004 purchase only rate was likely significantly higher than the 2010 purchase-only rate of 3.2%.

Since the VAT reform reduced rates so dramatically for most staples, it is somewhat surprising that the effective tax rates for the poorest households did not decrease by more. The main reason is the increased tax rates on other types of goods that even very poor households spend significant percentages of their income on. In 2010, the poorest 10% of the population spent 12% of their budget on items taxed at the revenue neutral rate of 12.5%. The taxes on this budget add up to 1.3% of expenditure – about 40% of their total tax payments. In 1994, the revenue neutral rate was lower, at 8%, and since households were poorer, they spent a larger share of their budget on true staples like rice, vegetables, and oil.

Conclusion

   The 2005 VAT reform in Bihar has achieved notable changes in the statutory tax system as well as its implied burden. The reform simplified the tax code from 20 categories to four main ones and a few side rates. Progressivity in the tax code improved – the gap in the tax rate between the richest and poorest deciles increased from 0.1 percentage points to 1.1 percentage points – and decreased rates by 1.1 percentage points for the median household. Despite this, revenue increased, likely due to better enforcement and lower compliance costs.

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Figures

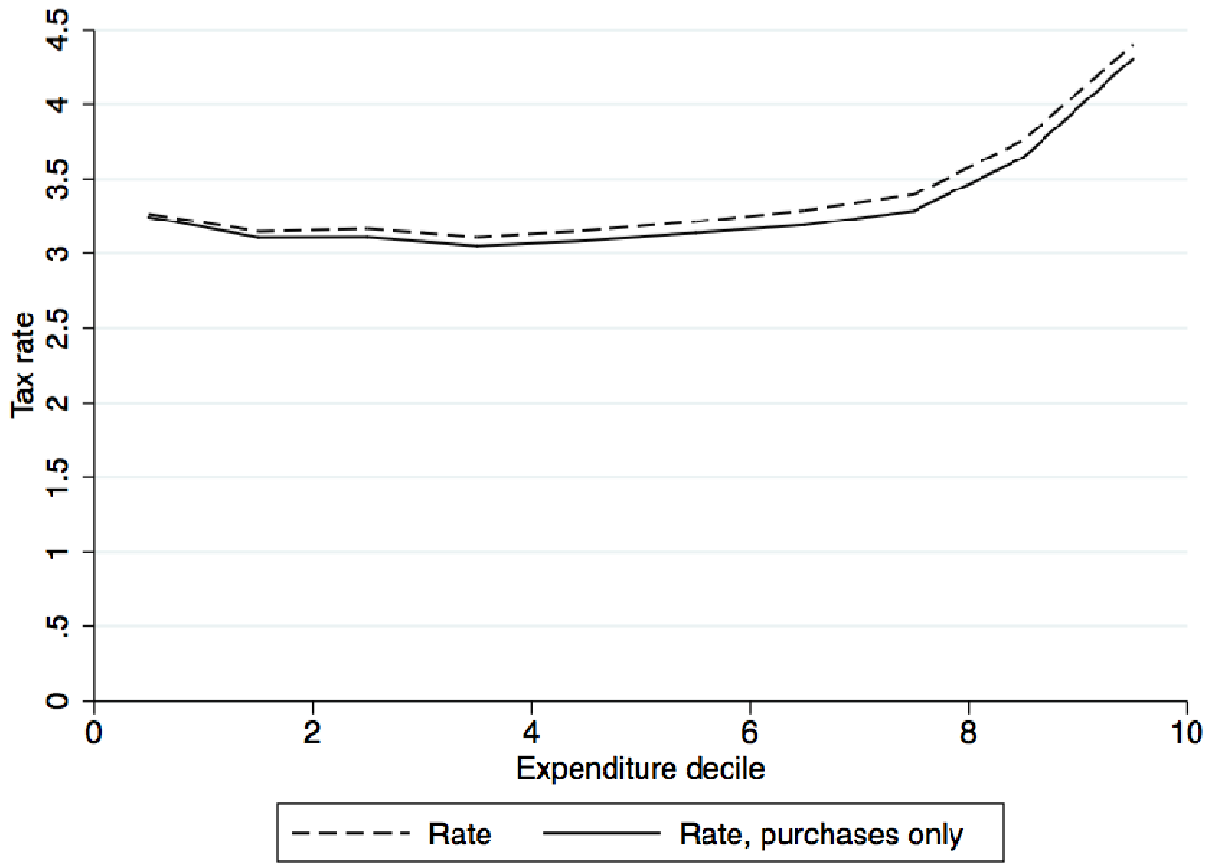Figure 1: Effective Tax Rates Under Different Consumption Assumptions, 2010

Figure 2: Effective Tax Rates Under Different Consumption Assumptions, 1994
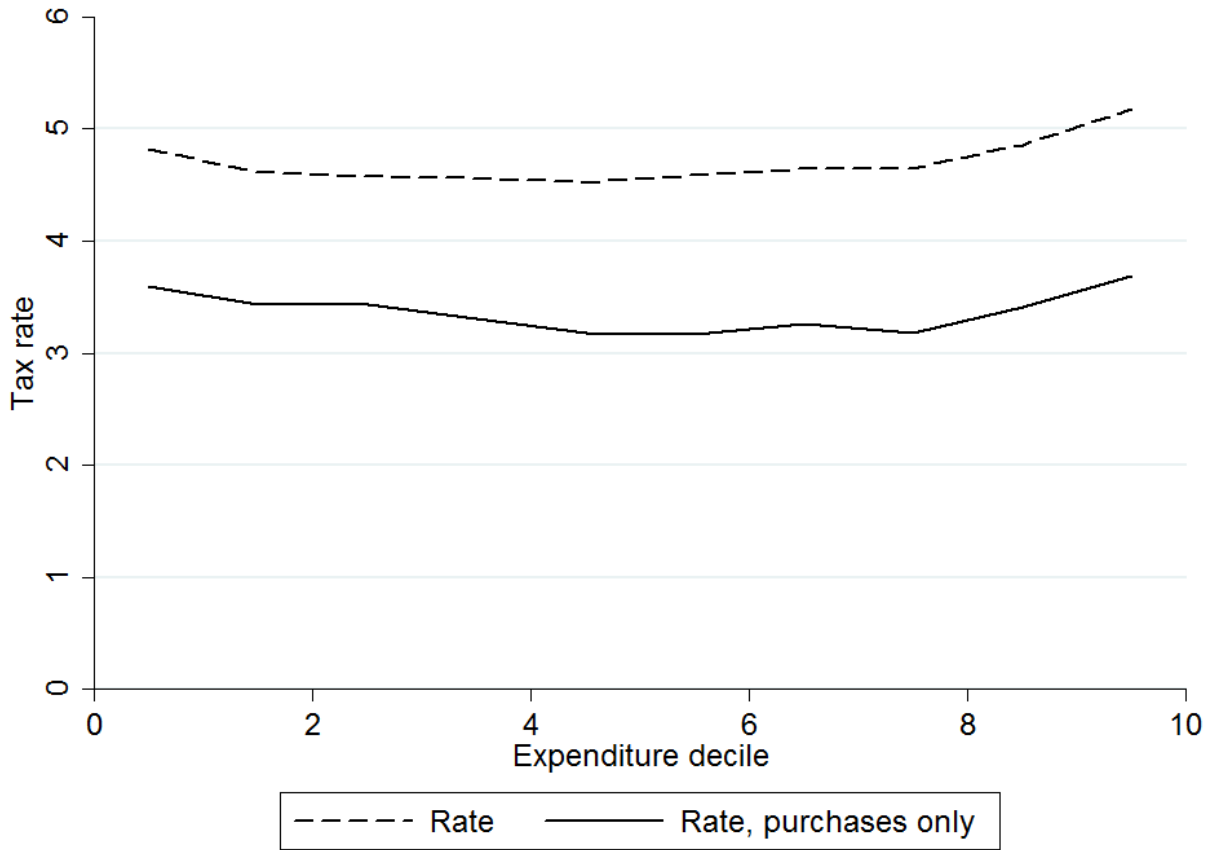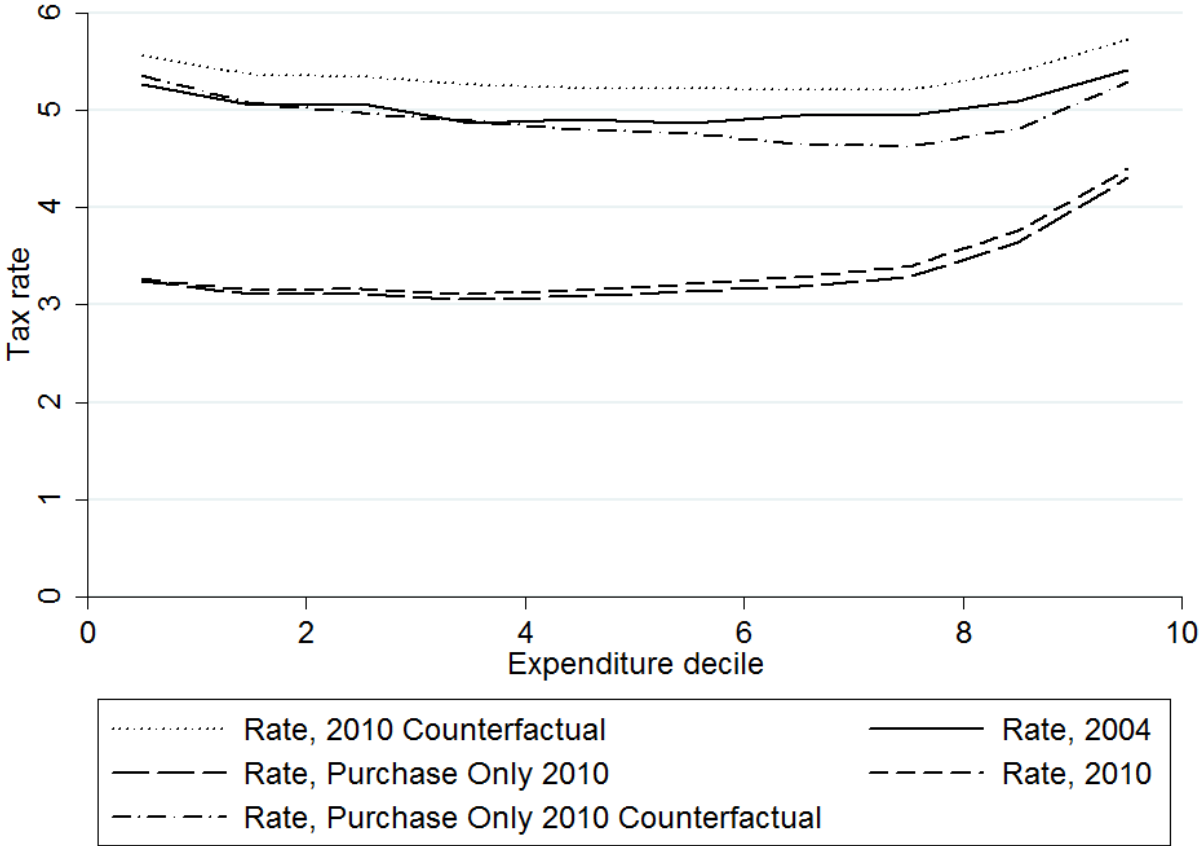
Figure 3: Implied Rates and Counterfactural Rates, by Expenditure Decile

Tables

Table 1: Tax Rates in Bihar; Select Commodities

	1994	2000	2004	2010
Cereals and pulses	4	4	4	1
Atta, maida, suji	4	4	4	1
Milk	.	0	0	0
Ghee	8	.	.	4
Vanaspati ghee	9	.	.	4
Edible oil	2	9	9	4
Meat and fish	0	.	.	0
Eggs	0	0	0	0
Potatoes and onions	5	5	5	0
Fresh fruit and vegetables	0	0	0	0
Spices	9	9	9	4
Tea	0	.	.	4
Biscuit	9	9	9	0
Sweets	6	6	8	0
Processed	.	8	10.7	4
Country liquor	0	25	25	50
Firewood	7	7	7	0
Kerosene	6	6	6	4
Cooking gas	9	.	.	1
Cotton	4	4	2	0
Hosiery	5	0	.	4
Readymade clothing	1	7	7	4
Footwear	8	0	0	4
Other hobbies	.	9	10.7	4
Maps and books	0	.	.	0
Medical	7	8	8.5	4
Petrol	9	16	21.5	24.5
Tech	.	11.7	12.6	4
Jewellery	4	4	4	1
Utensils	8	.	12	4
Bicycles	8	.	.	4
Motorcycle	9	10	12	4

1994 data from Purohit; 2000 onwards from Instavat

Period indicates missing data

Table 2: Empirical State Tax Incidence for 2004 and 2010 by Consumption Deciles

	Avg. Expend. 2004	Est. Tax Rate 2004	Avg. Expend. 2010	Est. Tax Rate 2010
1	1021	5.3	1571	3.3
2	1518	5.0	2293	3.1
3	1882	5.1	2757	3.2
4	2194	4.9	3185	3.1
5	2496	4.9	3624	3.2
6	2891	4.9	4135	3.2
7	3319	4.9	4738	3.3
8	3849	4.9	5543	3.4
9	4675	5.1	6794	3.8
10	7857	5.4	10905	4.4
Total	3170	5.0	4554	3.4

Missing data replaced with general tax rate of 8% in 2004, 12.5% in 2010.
Note: This table assumes all expenditure is taxed; see text for more details and Figure 3 for alternative counterfactuals.

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