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India's Move from Sales Tax to VAT: A Hit or Miss?

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Abstract

Government of India introduced Value Added Tax (VAT) across all its states in subsequent stages in the early years of this millennium. The main motive behind this move was to make the commercial tax collection more transparent, accountable and revenue enhancing. The purpose of this paper is to analyze if the introduction of VAT has indeed served its purpose or not. We find that in terms of the effective change in the rate of taxation and in terms of a change in the overall tax base, the number of states affected adversely by the new VAT regime is greater than the number of states that have been affected positively. Also the sum of the average tax collected, as well as the sum of the average state domestic product of the negatively affected states far outweighs those of the states affected favorably.

Key Words: Sales Tax, Value Added Tax, Revenue, India

JEL Classification: H20, H21, C23, C51, H71

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I. Introduction

Tax earning is one of the most important sources of revenue for any government. In India, indirect tax (i.e., tax on goods and services) contributes almost a quarter of the total revenue collected across the nation¹ and forms one of the chief sources of revenues for the state governments. During the last decade, the state governments of India² reached an agreement whereby the states decided to switch from the existing Sales Tax (ST) system to a new Value Added Tax (VAT) model of taxation of goods. According to a whitepaper published by the Empowered Committee of State Finance Ministers:

*“The State-level VAT ... has certain distinct advantages over the existing sales tax structure. The VAT will not only provide full set-off for input tax as well as tax on previous purchases, but it will also abolish the burden of several of the existing taxes ... As a result, the overall tax burden will be rationalised, and prices, in general, will fall. Moreover, VAT will replace the existing system of inspection by a system of built-in self-assessment by traders and manufacturers. The tax structure will become simple and more transparent. This will significantly improve tax compliance and will also help increase revenue growth.”*³

It's been almost a decade since a majority of the states have opted for VAT and this exercise addresses whether the introduction of VAT has indeed significantly diminished the overall tax burden and has improved the tax base of the states.

Before the introduction of VAT, indirect taxes on eligible goods were charged on an ad valorem basis whenever these items are transacted between a seller and a purchaser (which can be firms, intermediate sellers and consumers). In this form of sales tax, complete exemption is not given in respect to the inputs used in production of goods and this leads to cascading. In addition, the cost of holding inventories goes up which leads to higher interest payments and additional cascading. Because of these features of indirect sales tax, the system has been criticized on a number of grounds. It is argued that, this system of taxation creates an artificial incentive for vertical integration and leads to misallocation of resources, dampening the economic growth – ultimately having a negative impact on the tax base thereby hindering the process of revenue generation and resource mobilization of the Government. According to Cnossen (2012):

¹ According to the World Databank in India the contribution of Goods and Service Tax in Total Revenue collection is 24.12 per cent for the year 2011; Website: www.data.worldbank.org; Site accessed on 12th July 2013.

² Through the rest of this paper, the term ‘States’ is deemed to include ‘Union Territories.’

³ Whitepaper by The Empowered Committee of State Finance Ministers (2005).

“India’s system of indirect taxation at the central and state level is a serious obstacle to the formation of a single common market in which businesses source anywhere, manufacture anywhere and sell anywhere. Its complexity is baffling and its incidence highly capricious and indeterminate. The system’s multiple tax-on-tax effects cascade throughout the production-distribution chain with harmful economic consequences. These effects are compounded by the lack of coordination between various forms of indirect taxation (sales taxes, excise duties, import duties) and between different levels of government (Centre vs. States, and States vs. other States), as well as by the uneven enforcement of the respective tax administrations.”

To address these major problems of the prevailing taxation-system, VAT was introduced in the country in the early years of twenty-first century. VAT in theory, avoids the cascade effect of sales tax by taxing only the value added at each stage of production. It was thought that VAT would address the problems of the existing system of taxes (Purohit M. C., 1993) and its introduction was seen as an important breakthrough in the sphere of indirect tax reforms in India. The decision to implement state level VAT was reached in the meeting of the Empowered Committee (EC) of State Finance Ministers, held on June 18, 2004, where a consensus was arrived at to introduce VAT in all States. In spite of this, there were many controversies at the time of introducing VAT across the states. A major number of states were not convinced about the prospects of this new tax system and there was skepticism at different levels of the polity, society and economy. For instance, small entrepreneurs and businessmen were predicting a high compliance costs and harassment by the tax authorities, whereas the consumers were worried about the effect of VAT on prices of goods which are of their daily requirement. From the side of the business community concerns were raised, about the problems of obtaining refund on excess input tax, about the large number of goods which would be subject to VAT but were exempted from sales tax and about the higher tax rates on a number of goods under this new system of taxation. Add to that, the record keeping requirements under VAT would result in a waste of valuable time and an increase in the cost of doing business. More over VAT would pave the way for harassment of traders by the tax authorities⁴. To do away with these misconceptions a well-organized publicity campaign aimed at educating the stakeholders of the VAT system⁵, such as the business sector and the general public has been

⁴ Effectiveness of Publicity Campaign on Value Added Tax in India (Sthanumoorthy, 2008)

⁵ Whitepaper by the Empowered Committee of State Finance Ministers (2005).

initiated from the year 2005 and eventually at present, all the states and union territories have a VAT system in place.

II. Review of Related Literatures

Value Added Tax as an indirect tax collection mechanism has been adopted by more than 130 countries in the world. Many studies focused on impact of this switchover from Sales Tax to Value Added Tax method of collecting tax from the commercial sector of an economy. Ruggeri and Bluck (1990) have worked on the incidence of Manufacturers' Sales Tax (MST) and the Goods and Service Tax (GST) in France. They have found that VAT and GST are more regressive than the MST. Report by the European Commission (2004), points that losses from fraud have amounted to 10 percent of net VAT receipts in some member states. Most famously, the cost of carousel fraud in particular (a class of schemes exploiting the zero-rating of exports and deferral of tax on intra – EU imports) has been put at around €2.1 billion in Germany (roughly 1.5 percent of VAT revenue) and at £1.12–1.9 billion in the United Kingdom (about 1.5–2.5 percent of VAT revenue). Smart and Bird (2009) analyzed the economic impact of replacing the retail sales tax with VAT in Canada. The paper estimates the effects of this tax substitution on consumer prices in the provinces of the country where VAT was introduced. They found that the resulting effective tax rate changes were shifted forward to consumers in most of the sectors. However, the overall effect on tax inclusive consumer prices was small, regressive rather.

For the Indian scenario, various economists have worked on the emergence of Sales Tax and Value Added Tax in India. Notable among them are by Ayyar (1976), Purohit (1982) and (1986). The discussion on the adoption of Value Added Tax and its problems and prospects was first introduced by Purohit (1993). In this paper the author examines the general trends in the structure of VAT rates, tax base and exemptions in the countries which have adopted it. The author then presents his assessment of the existing system of commodity taxation in India and against that background, discusses the likely problems in introducing VAT in the context of the country's federal structure. In recent years, studies have also discussed about the wrong implementation procedure of VAT (Mukhopadhyay, 2002) and also if VAT is going to deliver more revenue for the government (Das-Gupta, 2005). Mukhopadhyay (2002) discusses the problem of inducing a tax like VAT in a federation as it involves a compromise between the interests of different states. Das-gupta (2005) in his descriptive paper focuses on the possible weaknesses of VAT which have escaped attention. The problem of large informal sector, invoice fraud, administrative hazard, etc. has been highlighted in this paper. These studies on

India, are purely based on theoretical and/or subjective perspective and we have not come across any empirical studies comparing these two different modes of taxation. The present paper aims to fulfill this gap in the existing literature and offer some empirical conclusions to some of the concerns presented in the literature.

III. Data

Our study compares the amounts of tax revenue collected by the state governments against the total value of outputs of goods produced in the states. For commercial tax collection (for both VAT and Sales Tax) we compiled data from the annual report - *State Finance: A study of Budgets* published by Reserve Bank of India. For the value of output, we use the component wise Gross State Domestic Product (GSDP) of the different states of India as provided by the Ministry of Statistics and Programme Implementation, Government of India. The data have been tabulated considering 2004 as our base year. Our data consist of 28 state level observations spanning a period from 1993 to 2011. Of the 28 states, 18 states are general category states while 10 states belong to special category⁶.

IV. Descriptive Statistics: Tax Effort in the Pre & Post VAT Regime

We begin with a preliminary exploration of the data. Summary statistics for the key variables are given in Table 1(a and b).

⁶ As per the Planning Commission of India.

Table 1a
Descriptive Statistics

<i>State total Sales Tax (in Rupees billion) over states</i>						<i>State GSDP (in Rupees billion) over states</i>				
Year	Mean	Median	Standard Deviation	Skewness	Kurtosis	Mean	Median	Standard Deviation	Skewness	Kurtosis
1993	22.6859	15.9326	24.8546	1.18936	3.90416	543.838	444.304	546.25	1.39193	4.84044
1994	24.8023	21.5508	26.9296	1.21752	4.02627	582.577	480.687	577.515	1.25983	4.27759
1995	26.114	19.8384	28.7778	1.33578	4.48504	612.108	469.989	623.956	1.39297	4.81748
1996	28.0239	21.7499	29.8108	1.11475	3.64588	658.337	511.237	669.19	1.33389	4.51991
1997	29.373	22.8897	31.121	1.06403	3.46402	691.54	531.555	695.956	1.33119	4.62293
1998	29.7163	22.0395	31.4242	1.01425	3.24644	731.865	558.193	730.008	1.24927	4.28603
1999	30.6895	24.1499	35.1008	1.34489	4.47378	746.947	574.281	782.913	1.37163	4.76634
2000	32.3853	20.4355	38.7252	1.42331	4.66834	759.232	564.75	787.969	1.2861	4.31746
2001	31.9133	18.0038	36.912	1.41896	4.58207	792.614	600.272	816.083	1.27046	4.31008
2002	34.342	19.2574	39.5731	1.45065	4.7607	822.782	596.39	855.306	1.35193	4.6546
2003	37.3378	20.9074	42.8393	1.43297	4.69335	891.951	686.734	922.735	1.32731	4.60544
2004	40.2599	20.9857	46.3173	1.46132	4.86328	962.572	777.294	996.691	1.34917	4.70764
2005	44.6499	23.8801	50.0351	1.28646	3.98375	1049.9	779.079	1114.82	1.43626	5.04195
2006	50.2632	24.9118	56.8276	1.33838	4.19302	1162.86	900.948	1247.79	1.50521	5.37889
2007	53.2997	23.9784	60.2668	1.29547	3.99562	1271.22	952.739	1373.46	1.5585	5.63865
2008	56.2768	29.6753	63.4878	1.33863	4.18431	1354.29	1068.57	1433.95	1.44957	5.16103
2009	58.7301	32.2407	65.0988	1.29968	4.09228	1462.51	1132.47	1553.99	1.49274	5.35904
2010	67.9593	32.1261	76.1862	1.34765	4.28986	1604.54	1245.37	1709.72	1.50672	5.42077
2011	77.5223	38.005	86.3001	1.29141	3.89379	1723.3	1306.69	1832.6	1.49854	5.39463
Total	41.5806	23.5056	51.283	2.00295	7.94715	973.402	603.716	1127.77	2.17253	9.79483

Source: Authors' calculation based on data.

Table 1b
Descriptive Statistics

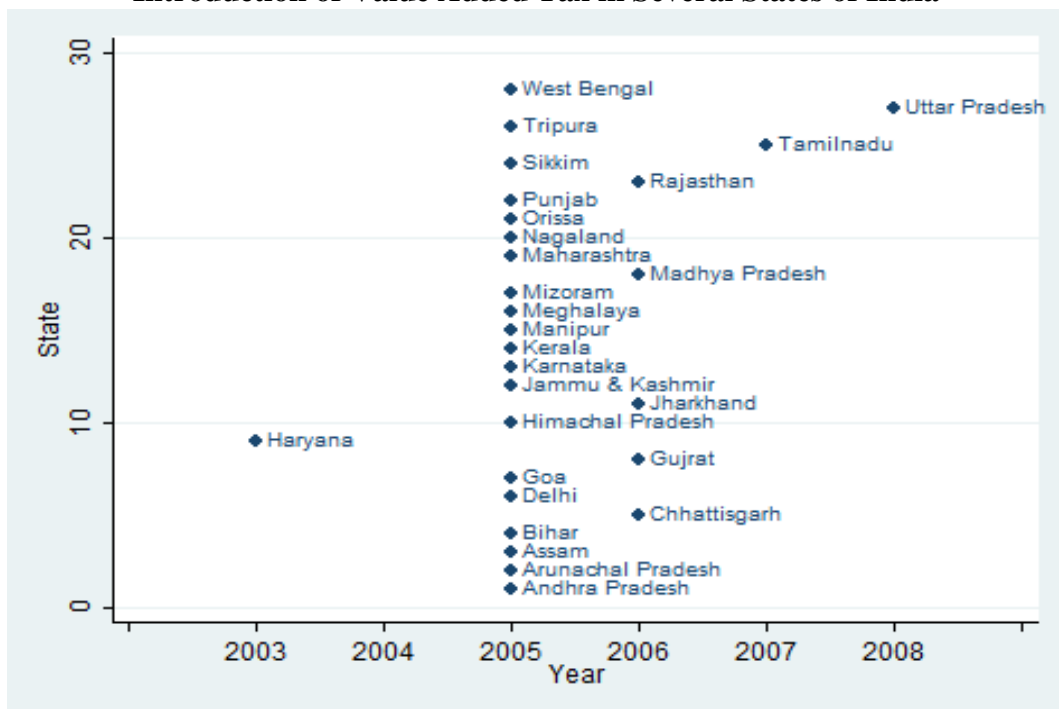
State	State total Sales Tax (in Rupees billion) over time					State GSDP (in Rupees billion) over time				
	Mean	Median	Standard Deviation	Skewness	Kurtosis	Mean	Median	Standard Deviation	Skewness	Kurtosis
General Category States										
Andhra Pradesh	109.652	94.6358	52.1454	0.6389	2.328	2233.67	1900.13	901.191	0.6612	2.141
Bihar	23.3447	23.2636	5.0692	1.0661	4.7585	778.569	693.396	285.846	0.9284	2.889
Chhattisgarh	20.9454	21.6577	9.0169	0.0202	2.3201	481.214	389.538	174.579	0.8038	2.2627
Delhi	50.2658	46.2369	23.2654	0.1834	2.0061	1014.45	849.697	483.004	0.7611	2.3751
Goa	6.0361	5.6719	1.9938	0.6719	3.0955	123.485	107.331	51.127	0.6735	2.4205
Gujarat	94.2333	74.2316	41.2273	1.0161	2.8257	2045.66	1627.47	928.934	0.7614	2.3193
Haryana	41.4127	37.0079	20.7823	0.3609	1.8268	933.134	804.244	416.324	0.6865	2.2262
Jharkhand	24.9974	21.7491	6.724	0.7095	2.1149	562.417	500.123	173.833	0.9183	2.892
Karnataka	83.3298	67.8579	31.239	0.6979	2.2858	1665.86	1467.17	630.786	0.5455	2.0301
Kerala	67.0705	62.7634	25.8772	0.9501	3.0456	1160.46	1020.71	452.371	0.6725	2.2259
Madhya Pradesh	39.9147	33.3669	15.9311	1.0346	3.1614	1154.82	1026.34	371.967	0.8993	2.8378
Maharashtra	178.093	159.388	69.4656	0.6933	2.4429	4262.2	3538.85	1770.34	0.7273	2.2087
Orissa	24.3743	19.2574	11.6275	0.774	2.3724	755.604	600.272	286.939	0.688	2.0157
Punjab	35.5909	32.4944	15.896	0.8546	2.8313	968.07	869.875	299.524	0.633	2.1704
Rajasthan	45.2131	39.2732	20.2892	0.4427	1.8634	1280.01	1122.68	468.919	0.7177	2.5345
Tamil Nadu	126.021	112.416	47.4985	0.8319	2.9928	2294.43	1854.01	949.896	0.835	2.4787
Uttar Pradesh	93.1412	80.9597	43.7688	0.8431	2.7322	2614.04	2350.86	771.246	0.7137	2.3458
Uttarakhand	11.3672	10.7513	6.1511	0.3196	2.2155	269.612	203.827	150.476	0.9866	2.5682
West Bengal	54.9394	45.861	18.6764	0.9986	2.9181	1981.25	1838.16	688.663	0.434	2.0291
Special Category States										
Arunachal Pradesh	0.3593	0.2297	0.3709	0.5687	1.8511	32.1821	28.2032	12.2109	0.6678	2.1223
Assam	17.3009	16.1165	8.1633	0.4918	1.9605	521.867	485.512	127.524	0.8361	2.569
Himachal Pradesh	6.2773	4.1994	4.4496	1.1363	3.2413	233.272	207.094	92.6891	0.5959	2.1739
Jammu and Kashmir	8.0428	5.7049	5.8342	0.7769	2.4028	263.822	246.718	73.5176	0.4743	2.0573
Manipur	0.6893	0.5199	0.5235	1.0734	3.0536	47.9628	42.415	14.0699	0.4745	2.0485
Meghalaya	1.343	1.0496	0.8165	0.6926	2.1824	63.0619	57.3366	24.1425	0.5611	2.1711
Mizoram	0.424	0.4017	0.2921	0.3466	2.0088	31.5165	28.6942	9.7052	0.6635	2.1713
Nagaland	0.6201	0.4898	0.3814	1.0073	2.9936	55.5588	53.1582	21.1267	0.416	1.8424
Sikkim	0.4445	0.4818	0.2724	0.2278	1.7625	19.8068	14.9634	13.2954	1.4667	3.7839
Tripura	1.6816	1.4664	1.2244	0.9734	3.0941	83.2177	77.7612	36.3785	0.5399	2.1885
Total	41.5806	23.5056	51.283	2.003	7.9471	973.402	603.716	1127.77	2.1725	9.7948

Source: Authors' calculation based on data.

In order to comment on the dynamics of the States' indirect commodity tax collection, we first consider how, the amount of the total indirect commodity tax collected by the different states as a proportion of their gross domestic products (this gross state domestic product is hereafter referred to as GSDP), have changed across the two tax regimes. This ratio which serves as a crude indicator to measure the tax effort of the respective states, provide us an overview of the impact of the introduction of VAT on the amount of tax collection. Here, it is to be noted that, the Indian states have started introducing VAT as a commercial tax collection mechanism from the year 2003. Haryana was the first state to introduce VAT in 2003 and Uttar Pradesh was the last to do the same in 2008 (refer to Figure: 1).

Figure: 1

Introduction of Value Added Tax in Several States of India



However, majority of the states have gone for implementing VAT in 2005. A visual inspection of the average tax – GSDP ratios of the states in the pre and post VAT regime (refer to Table 2), suggests that the introduction of VAT has indeed resulted in an increase in the average tax – GSDP ratio for all but seven general category states of the country. Among the general category states, this average ratio has decreased for Bihar, Goa, Gujarat, Karnataka, Kerala, Maharashtra and West Bengal whereas it has increased for the remaining states of Andhra Pradesh, Chhattisgarh, Delhi, Haryana, Jharkhand, Madhya Pradesh, Orissa, Punjab, Rajasthan

Tamil Nadu, Uttarakhand, and Uttar Pradesh. The states which have gained the maximum after introducing VAT in terms of a quantitative increase in the tax – GSDP ratio are, Uttar Pradesh followed by Chhattisgarh and Uttarakhand, while Bihar and Goa are worst affected states (refer to table 2). None of the special category states have been negatively affected and all these states have registered a hike in the average tax – GSDP ratio after having VAT introduced. Again, in terms of the amount of an increase in the tax – GSDP ratio, Jammu & Kashmir have benefitted the maximum followed by Assam, Himachal Pradesh, Arunachal Pradesh and Mizoram. The north – eastern states of Nagaland and Sikkim have gained relatively marginally.

Table 2
Changes in tax-GSDP Ratios

States	Average tax-GSDP Ratio in ST Regime	Standard Deviation of tax-GSDP Ratio in ST Regime	Average tax-GSDP Ratio in VAT Regime	Standard Deviation of tax-GSDP Ratio in VAT Regime	Change in Average tax-GSDP Ratio
<i>General Category States</i>					
Andhra Pradesh	0.0456	0.0049	0.0513	0.0019	0.0057
Bihar	0.0392	0.0107	0.0225	0.0020	-0.0167
Chhattisgarh	0.0312	0.0089	0.0398	0.0027	0.0086
Delhi	0.0490	0.0104	0.0498	0.0045	0.0008
Goa	0.0536	0.0051	0.0458	0.0048	-0.0078
Gujarat	0.0474	0.0044	0.0455	0.0018	-0.0018
Haryana	0.0393	0.0044	0.0472	0.0044	0.0079
Jharkhand	0.0375	0.0056	0.0382	0.0036	0.0007
Karnataka	0.0505	0.0032	0.0499	0.0023	-0.0006
Kerala	0.0594	0.0023	0.0560	0.0034	-0.0033
Madhya Pradesh	0.0326	0.0023	0.0368	0.0022	0.0041
Maharashtra	0.0433	0.0027	0.0403	0.0013	-0.0029
Orissa	0.0293	0.0027	0.0347	0.0024	0.0055
Punjab	0.0328	0.0040	0.0402	0.0041	0.0074
Rajasthan	0.0325	0.0043	0.0381	0.0014	0.0056
Tamil Nadu	0.0210	0.0084	0.0253	0.0086	0.0043
Uttarakhand	0.0270	0.0095	0.0351	0.0022	0.0081
Uttar Pradesh	0.0320	0.0046	0.0417	0.0033	0.0097
West Bengal	0.0286	0.0038	0.0274	0.0015	-0.0011
<i>Special Category States</i>					
Arunachal Pradesh	0.0040	0.0053	0.0166	0.0022	0.0126
Assam	0.0266	0.0056	0.0401	0.0028	0.0135
Himachal Pradesh	0.0194	0.0016	0.0327	0.0049	0.0132
Jammu and Kashmir	0.0184	0.0056	0.0421	0.0055	0.0237
Manipur	0.0091	0.0030	0.0193	0.0046	0.0101
Meghalaya	0.0164	0.0023	0.0252	0.0015	0.0089
Mizoram	0.0043	0.0034	0.0166	0.0016	0.0123
Nagaland	0.0088	0.0009	0.0130	0.0018	0.0042
Sikkim	0.0210	0.0084	0.0253	0.0086	0.0043
Tripura	0.0144	0.0031	0.0239	0.0032	0.0095

Note: ST – Sales Tax; VAT-Value Added Tax; Change in Average tax-GSDP Ratio is calculated by subtracting the Average tax-GSDP Ratio in ST Regime from Average tax-GSDP Ratio in VAT regime.

Source: Authors' calculation based on data.

Although the tax – GSDP ratio helps us to shed some light about the changes in the tax collections between regimes, more formal statistical modelling is necessary to truly discern the

sources and the implications of the changes in the trends associated with the introduction of VAT. Based on the objective of the paper we are interested in the impact of the switchover from ST to VAT on the untaxable volume of GSDP and the effective rate of taxation for which, an analysis that is based solely on the tax – GSDP ratio of the two tax regime, is not sufficient to fulfil the objective.

In what follows we therefore build up a model using which, we can compare between the relative efficacies of the two tax mechanisms in terms of the aforementioned factors.

V. An empirical model

The total indirect tax collection is a sum of individual tax collected from various economic entities (which may be firms, sellers intermediate or otherwise) of an economy. These individual taxes are in turn, some predetermined fractions of the output of the respective sectors. Ideally:

$$T = \sum_j \beta_j x_j$$

where T is the total indirect tax collection, x_j is either the value of output (in case of sales tax) or the value added (in case of VAT) of the j^{th} economic entity and β_j is the rate at which the j^{th} entity is taxed (which may be zero). But we cannot possibly have data on these economic entities at such a disaggregated level. So instead, we suggest an alternative methodology where we utilize the aggregated value of output and rewrite the above identity as:

$$T = \beta Y - U \quad \dots (1)$$

In the above relation, T retains its previous definition as the total indirect tax collection, Y is the value of the aggregate output of the economy, β is the effective tax rate and U is the potential untaxed amount that the government foregoes since a portion of the aggregate output is not taxed – either by law or because of tax evasion. For our purpose, we inspect two aspects of the above relationship; that across the tax regimes, if there has been a significant change in the effective rate of taxation (i.e., β) and if there has been any significant change in the overall tax base captured by the change in the mean level of the potential untaxed component (i.e., U). Thus keeping in accord with the above relation, we suggest the following empirical model:

$$T_{it} = \begin{cases} \alpha_i^{ST} + \beta_i^{ST} Y_{it} + \epsilon_{it} & \text{if } t < T_{VAT} \\ \alpha_i^{VAT} + \beta_i^{VAT} Y_{it} + \epsilon_{it} & \text{if } t \geq T_{VAT} \end{cases} \quad \dots (2)$$

which can be written more compactly as:

$$T_{it} = \alpha_i^{ST} + \Delta\alpha_i I + \beta_i^{ST} (1 - I) Y_{it} + \beta_i^{VAT} I Y_{it} + \epsilon_{it} \quad \dots (3)$$

where $I = \begin{cases} 0 & \text{if } t < T_{VAT} \\ 1 & \text{if } t \geq T_{VAT} \end{cases}$, $\Delta\alpha_i \equiv \alpha_i^{VAT} - \alpha_i^{ST}$

and subscript ‘ i ’ represents the states and ‘ t ’ the time period associated with the respective observation or coefficients. Special attention needs to be paid to the terms: ϵ_{it} and α_i . The term ϵ_{it} not only constitutes the state specific random shock (that represents, for example, the errors in observations) but is also comprised of the demeaned potential untaxed part of the state (recall the term U of equation (1)) whereas α_i captures the mean component of the same.

Equation (3) constitutes our baseline model. Our interest is to test for the significance of $\beta_i^{VAT} - \beta_i^{ST}$ which reflects the change in the effective tax rate for the ‘ i^{th} ’ state as also the significance of $\Delta\alpha_i$, which captures the change in the overall tax base of the state as a result of a change in the tax regime. For the state, a significant negative $\beta_i^{VAT} - \beta_i^{ST}$ indicates an overall decrease in the effective rate of taxation with the introduction of VAT whereas a significant positive $\Delta\alpha_i$ represents an increase in the overall tax base of the state in the post – VAT regime achieved by a decrease in the potential untaxed part of the state (as the expected sign of α_i^{ST} and α_i^{VAT} is negative). In what follows, we estimate equation (3) using our panel level data on the Indian states.

VI. Estimation and results

As discussed above, our data consist of the amounts of states’ total sales tax revenues on commodities and is composed of the components: state sales tax/VAT, central sales tax, sales tax on motor spirit and lubricants, surcharge on sales tax, turnover tax and other receipts. We also have data on state level annual GSDP (in real terms with 2004 as the base period) split into various sectors⁷ spanning a time period of 19 years starting from the year 1993. All of our data on taxes have been adjusted with respect to changes in price considering the year 2004 as our base period. Since indirect taxes collected by the states are not levied from all the sectors (which constitutes the GSDP) we consider the sum of outputs of only those sectors which are subject to such taxation (which consists of the sectors – agriculture, combined forestry and logging, fishing, mining and quarrying, registered manufacturing, construction, combined trade, hotels and restaurants, combined electricity, gas and water supply and finally transport by other means) and have thus omitted the service sectors from the GSDP (the constituents of which are: transport by railways, storage and communication, combined banking and

⁷ These sectors are: agriculture, combined forestry and logging, fishing, combined mining and quarrying, registered and unregistered manufacturing, construction, combined electricity, gas and water supply, combined transport by railways and other means, storage and communication, combined trade, hotels and restaurants, combined banking and insurance, combined real estate, ownership of dwellings and business services, combined public administration and defense and lastly other services.

insurance, combined real estate, ownership of dwellings and business services, combined public administration and defense and other services) as also unregistered manufacturing. Our model structure suggests that the error component is inclusive of the demeaned potential untaxed part and as such, should be correlated with the value of the aggregate output, i.e., Y_{it} . So we use the values of outputs of registered manufacturing, construction and combined outputs of trade, hotels and restaurants as instruments while estimating equation (3) using fixed effects panel estimation utilizing generalized methods of moments with instrumental variables. The rationale behind using the values of outputs of these particular sectors as instruments is that, the incidence of taxation is very high on these aforementioned sectors compared to the others and the firms belonging to these sectors are relatively more likely to be registered with the government (chiefly because of the nature of their output and thus they have an untaxed amount which is close to zero). As the errors are very likely to be heteroscedastic as well as auto correlated, we use heteroscedasticity and autocorrelation consistent (HAC) standard errors (computed using quadratic spectral kernel with a rule of thumb bandwidth of 3 periods based on the number of observations and with finite sample correction⁸) for our significance tests. We begin by reporting the results of our estimation which is summarized in Table 3. The table also reports the centered and uncentered R – squared for the model goodness of fit and Hansen J statistic of over identifying restrictions to check for the validity of all instruments.

⁸ Andrews and Monahan (1992).

Table 3
Estimation results (Total sales tax collected by the states)

States	Coefficient of GSDP under ST regime (I)	Coefficient of GSDP under VAT regime (II)	$\Delta\alpha_i$ (in Rs lakhs)	Coefficient (I)=(II) (p-values)	Coefficient (I)<=(II) (p-values)
General Category States					
Andhra Pradesh	0.1115*** (0.0094)	0.1098*** (0.0107)	-108881.7969 (217301.0000)	0.9022	0.4511
Bihar	-0.0326*** (0.0124)	0.0459*** (0.0022)	-419777.9063*** (60976.3100)	0.0000	1
Delhi	0.1873*** (0.0204)	0.1663*** (0.0404)	76452.7891 (199632.3000)	0.5464	0.2732
Goa	0.0564*** (0.0077)	0.0540*** (0.0096)	1531.9580 (13576.4400)	0.8219	0.411
Gujarat	0.0467*** (0.0086)	0.0684*** (0.0100)	-297733.3125 (314133.6000)	0.2275	0.8862
Haryana	0.0946*** (0.0165)	0.0519*** (0.0084)	312070.5000** (142600.5000)	0.0655	0.0328
Jharkhand	-0.0696 (0.0904)	0.0844*** (0.0147)	-610450.6250* (330916.5000)	0.0753	0.9624
Karnataka	0.0388 (0.0554)	0.1412* (0.0786)	-1191085.0000 (1356310.0000)	0.3488	0.8256
Kerala	0.0925*** (0.0134)	0.1941*** (0.0286)	-902810.5000*** (313049.1000)	0.0050	0.9975
Madhya Pradesh	0.0693*** (0.0057)	0.0679*** (0.0101)	18896.8594 (116446.1000)	0.9196	0.4598
Maharashtra	0.0992*** (0.0163)	0.1022*** (0.0111)	-423634.9063 (626835.7000)	0.9048	0.5476
Orissa	0.1403** (0.0707)	0.0327 (0.0218)	532652.3750 (409491.9000)	0.2182	0.1091
Punjab	0.0880*** (0.0166)	0.0991*** (0.0268)	-73775.8828 (251045.8000)	0.7467	0.6266
Rajasthan	0.0758*** (0.0064)	0.0408*** (0.0081)	387023.8125*** (92887.3700)	0.0000	0
Tamil Nadu	0.1142*** (0.0080)	0.1055*** (0.0157)	-67669.3984 (297743.5000)	0.5939	0.2969
Uttar Pradesh	0.1023*** (0.0045)	0.1156*** (0.0271)	-253078.2969 (594138.3000)	0.6110	0.6945
Uttarakhand	0.1538** (0.0651)	0.0452*** (0.0037)	162492.5938* (88875.1500)	0.0982	0.0491
West Bengal	0.0330*** (0.0068)	0.0801*** (0.0049)	-601127.0000*** (99105.7900)	0.0000	1
Special Category States					
Arunachal Pradesh	-0.2570 (1.4012)	0.0519 (0.0758)	-74377.7969 (361375.4000)	0.8309	0.5846
Assam	0.1813*** (0.0197)	0.0770*** (0.0161)	394347.0000*** (81920.9600)	0.0000	0

Himachal Pradesh	0.0374*** (0.0028)	0.0932*** (0.0099)	-96207.3984*** (21418.7500)	0.0000	1
Jammu and Kashmir	0.0988*** (0.0119)	0.2490*** (0.0233)	-246979.2969*** (53981.4800)	0.0000	1
Manipur	0.0200*** (0.0023)	0.0855*** (0.0043)	-21538.3301*** (1925.5870)	0.0000	1
Meghalaya	0.0405*** (0.0027)	0.0553*** (0.0020)	-4110.4941*** (1406.9600)	0.0000	1
Mizoram	0.1066*** (0.0062)	0.0496*** (0.0031)	8407.7676*** (735.6998)	0.0000	0
Nagaland	0.0151*** (0.0020)	0.0542*** (0.0060)	-12692.9502*** (2590.8360)	0.0000	1
Sikkim	0.1021*** (0.0159)	0.0044* (0.0024)	10202.4902*** (946.5291)	0.0000	0
Tripura	0.0472*** (0.0040)	0.0626*** (0.0126)	-8234.9004 (9977.4340)	0.2957	0.8522

Hansen J statistic
(overidentification test of
all instruments): 27.8160
Chi-square(28) P-value: 0.4742

IV Reset Test
(H₀: E(y|X) linear in X): 2.7200
Chi-square(3) P-value: 0.4363

R²: 0.9705 (uncentered)
0.9705 (centered)

Number of observations: 511

The results show that the estimated values of β^{ST} and β^{VAT} are significant at 1% level for most of the states⁹. A significance test for the equality of β^{ST} and β^{VAT} (reported in column 5 of the table) reveals that for most of the general category states that include Andhra Pradesh, Delhi, Goa, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Punjab, Tamil Nadu, Uttar Pradesh, and two of the special category states namely, Arunachal Pradesh and Tripura there have been no significant change in the effective rate of taxation. On the other hand (as indicated by the figures reported in column 6 of the table), following the introduction of VAT, this rate has increased for a few general category states like Bihar, Jharkhand, Kerala and West Bengal, and a majority of the special category states which include Himachal Pradesh, Jammu and Kashmir, Manipur, Meghalaya, and Nagaland. It is only for the general category states of Haryana, Rajasthan and Uttarakhand and the special category states of Assam, Mizoram and Sikkim that the results indicate a net decrease in the effective rate of taxation with the advent of VAT.

Next we look at the change in the overall tax base of the states as a result of the introduction of VAT. As we have mentioned before, this is captured by $\Delta\alpha_i$ (reported in column 4 of the table) which represents the overall change in the tax base of the respective state in the post – VAT regime. The results clearly indicate that just like the case of the effective rate of taxation, the general category states of Andhra Pradesh, Delhi, Goa, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Punjab, Tamil Nadu, Uttar Pradesh, and the special category states of Arunachal Pradesh and Tripura have registered no significant change in the overall tax base. Also in accord with the effective rate of taxation, the states of Bihar, Jharkhand, Kerala and West Bengal belonging to the general category states and the states of Himachal Pradesh, Jammu and Kashmir, Manipur, Meghalaya, and Nagaland belonging to the special category states have experienced a contraction in their overall tax base while the reverse can be observed for the general category states of Haryana, Rajasthan and Uttarakhand and the special category states of Assam, Mizoram and Sikkim.

In addition to these results, our estimation yields a value of R^2 (both centered and uncentered) which indicates that our baseline model specification adequately explains the tax collection of the states. Apart from this, the Hansen J statistic reported in the table indicates that our choice of instruments is valid for our purpose and as such, the instruments are uncorrelated with our

⁹ Note that a negative estimate of the coefficient associated with the GSDP of Bihar may be attributed to the fact that, the data available on sales tax collection for this state, are mostly revised estimates and are not true budget accounts.

error term¹⁰. Also reported is Ramsey's (1969) regression specification-error test (RESET) as adapted by Pesaran and Taylor (1999) and Pagan and Hall (1983) for instrumental variables (IV) estimation.

From these results, we are prompted to conclude that, contrary to the views expressed in the Whitepaper by The Empowered Committee of State Finance Ministers (2005), for a majority of the states, there has been no significant positive impact of the introduction of VAT both in terms of the effective decrease in the rate of taxation as also in terms of a net increase in the overall tax base. Also, not only are the number of states affected adversely by the new VAT regime, greater than the number of states that have been affected positively, but the sum of the average tax collected, as well as the sum of the average state domestic product of the negatively affected states far outweighs those of the states affected favorably.

VII. Robustness

In order to further validate our claims, we conduct two additional exercises. First, instead of considering the states' total sales tax revenues on commodities as our dependent variable, we rerun our exercise after deducting from our dependent variable, the central sales tax (hereafter referred to as CST) as accrued by the states. This is chiefly because CST relates to certain goods that are deemed to be of special importance in inter – state trade or commerce and the entire revenue accruing under the levy of CST is collected and kept by the state in which the sale originates. CST being an origin based tax, is thus inconsistent with the destination based VAT and as per the Whitepaper by the Empowered Committee of State Finance Ministers (2005), a decision has been taken for duly phasing out of inter – state sales tax or CST. Accordingly an amendment to the Central Sales Tax Act was effected in to provide for reduction of the rate of CST from 4% to 3% with effect from 1st April, 2007. CST rate has been further reduced from 3% to 2% with effect from 1st June, 2008.

As our second robustness check we redo our initial exercise dropping the states of Bihar, Jharkhand and Uttarakhand, as the data on sales tax available for these states, are either mostly revised estimates (e.g., for Bihar) or are available only for a few periods (e.g., for Jharkhand and Uttarakhand). The results from these two exercises are summarized in Tables 4 and 5.

¹⁰ We have also conducted tests that indicate that the residues from our estimation are stationery but these results are not reported in the tables but are freely available with the authors.

Table 4
Estimation results (Total sales tax collected by the states excluding CST)

States	Coefficient of GSDP under Sales Tax regime (I)	Coefficient of GSDP under VAT regime (II)	$\Delta\alpha_i$ (in Rs lakhs)	Coefficient (I)=(II) (p-values)	Coefficient (I)<=(II) (p-values)
<i>General Category States</i>					
Andhra Pradesh	0.1074*** (0.0099)	0.1085*** (0.0086)	-153094.0938 (181759.0938)	0.9275	0.5362
Bihar	-0.0189** (0.0085)	0.0476*** (0.0054)	-370450.0000*** (50593.8203)	0.0000	1.0000
Delhi	0.1278*** (0.0253)	0.1804*** (0.0368)	-227065.7031 (162844.7969)	0.0907	0.9546
Goa	0.0502*** (0.0076)	0.0514*** (0.0079)	282.0608 (10927.4805)	0.8997	0.5502
Gujarat	0.0362*** (0.0095)	0.0529*** (0.0094)	-148417.7031 (310955.1875)	0.3550	0.8225
Haryana	0.0733*** (0.0133)	0.0562*** (0.0049)	157934.2031* (95182.1016)	0.3035	0.1518
Jharkhand	-0.1148 (0.0909)	0.0910*** (0.0155)	-829887.8750*** (301803.9063)	0.0125	0.9937
Karnataka	0.0291 (0.0529)	0.1523** (0.0701)	-1446573.0000 (1206642.0000)	0.2107	0.8947
Kerala	0.0881*** (0.0148)	0.2027*** (0.0214)	-1011916.0000*** (250187.0938)	0.0002	0.9999
Madhya Pradesh	0.0718*** (0.0082)	0.0663*** (0.0090)	53364.9805 (128979.8984)	0.7206	0.3603
Maharashtra	0.0920*** (0.0160)	0.0980*** (0.0099)	-431893.1875 (584447.8750)	0.8034	0.5983
Orissa	0.1085 (0.0692)	0.0409** (0.0196)	304146.9063 (389981.1875)	0.4221	0.2111
Punjab	0.0828*** (0.0161)	0.1037*** (0.0255)	-120812.3984 (242514.2969)	0.5345	0.7327
Rajasthan	0.0712*** (0.0061)	0.0371*** (0.0084)	379110.0938*** (97125.8672)	0.0000	0.0000
Tamil Nadu	0.1014*** (0.0074)	0.1019*** (0.0145)	-134199.0000 (278266.3125)	0.9728	0.5136
Uttar Pradesh	0.0944*** (0.0051)	0.1017*** (0.0279)	-127071.2031 (626179.0000)	0.7925	0.6038
Uttarakhand	-0.0225 (0.0380)	0.0832*** (0.0118)	-191071.7031** (79385.9688)	0.0208	0.9896
West Bengal	0.0331*** (0.0041)	0.0807*** (0.0038)	-625890.8125*** (75388.7031)	0.0000	1.0000
<i>Special Category States</i>					
Arunachal Pradesh	-0.2567 (1.1726)	0.0519 (0.0639)	-74286.0078 (302367.0000)	0.7989	0.6006

Assam	0.1870*** (0.0279)	0.0405* (0.0213)	552648.1250*** (111820.8984)	0.0000	0.0000
Himachal Pradesh	0.0356*** (0.0029)	0.0766*** (0.0088)	-68793.8203*** (18465.4902)	0.0000	1.0000
Jammu and Kashmir	0.0988*** (0.0118)	0.2487*** (0.0233)	-246340.2031*** (53784.6211)	0.0000	1.0000
Manipur	0.0201*** (0.0023)	0.0855*** (0.0044)	-21520.3008*** (1934.6890)	0.0000	1.0000
Meghalaya	0.0393*** (0.0072)	0.0461*** (0.0023)	959.3274 (2999.7661)	0.4349	0.7825
Mizoram	0.1067*** (0.0059)	0.0496*** (0.0031)	8416.0068*** (693.9545)	0.0000	0.0000
Nagaland	0.0151*** (0.0020)	0.0541*** (0.0060)	-12670.8701*** (2596.5310)	0.0000	1.0000
Sikkim	0.0878*** (0.0172)	0.0045* (0.0024)	8943.9971*** (1033.3430)	0.0000	0.0000
Tripura	0.0474*** (0.0039)	0.0627*** (0.0133)	-8192.0645 (10371.8203)	0.3196	0.8402

Hansen J statistic
(overidentification test of
all instruments): 27.5430
Chi-square(28) P-value: 0.4889

IV Reset Test
(H₀: E(y|X) linear in X): 2.5100
Chi-square(3) P-value: 0.4731

R²: 0.9695 (uncentered)
0.9695 (centered)

Number of observations: 511

Table 5
Estimation results (Bihar, Jharkhand and Uttarakhand dropped)

States	Coefficient of GSDP under Sales Tax regime (I)	Coefficient of GSDP under VAT regime (II)	$\Delta\alpha_i$ (in Rs lakhs)	Coefficient (I)=(II) (p-values)	Coefficient (I)<=(II) (p-values)
<i>General Category States</i>					
Andhra Pradesh	0.1115*** (0.0093)	0.1098*** (0.0106)	-108906.2031 (216469.2969)	0.9018	0.4509
Delhi	0.1873*** (0.0203)	0.1662*** (0.0402)	76664.8594 (198630.4063)	0.5436	0.2718
Goa	0.0564*** (0.0076)	0.0540*** (0.0095)	1531.4690 (13525.2803)	0.8213	0.4107
Gujarat	0.0467*** (0.0085)	0.0683*** (0.0099)	-297150.0000 (312307.9063)	0.2255	0.8872
Haryana	0.0946*** (0.0164)	0.0519*** (0.0084)	312101.0000** (142070.7031)	0.0646	0.0323
Karnataka	0.0396 (0.0551)	0.1401* (0.0781)	-1168830.0000 (1348391.0000)	0.3550	0.8225
Kerala	0.0925*** (0.0133)	0.1941*** (0.0285)	-902726.6250*** (311303.5938)	0.0048	0.9976
Madhya Pradesh	0.0693*** (0.0057)	0.0679*** (0.0101)	18914.2891 (115990.3984)	0.9191	0.4596
Maharashtra	0.0992*** (0.0163)	0.1022*** (0.0111)	-423209.8125 (624556.1875)	0.9050	0.5475
Orissa	0.1405** (0.0705)	0.0327 (0.0217)	533724.6875 (408398.5938)	0.2162	0.1081
Punjab	0.0880*** (0.0165)	0.0991*** (0.0267)	-73785.4375 (250094.0938)	0.7457	0.6271
Rajasthan	0.0758*** (0.0064)	0.0408*** (0.0081)	387106.0000*** (92620.0469)	0.0000	0.0000
Tamil Nadu	0.1142*** (0.0079)	0.1055*** (0.0157)	-67616.6172 (296613.1875)	0.5923	0.2961
Uttar Pradesh	0.1023*** (0.0045)	0.1156*** (0.0270)	-252903.5000 (592038.8125)	0.6099	0.6950
West Bengal	0.0330*** (0.0068)	0.0801*** (0.0048)	-601091.6250*** (98639.5469)	0.0000	1.0000
<i>Special Category States</i>					
Arunachal Pradesh	-0.2570 (1.3932)	0.0519 (0.0754)	-74370.6172 (359312.1875)	0.8300	0.5850
Assam	0.1813*** (0.0196)	0.0770*** (0.0161)	394348.1875*** (81596.5391)	0.0000	0.0000
Himachal Pradesh	0.0374*** (0.0027)	0.0932*** (0.0099)	-96207.1875*** (21337.3906)	0.0000	1.0000
Jammu and Kashmir	0.0988*** (0.0118)	0.2490*** (0.0233)	-246971.7969*** (53774.3711)	0.0000	1.0000
Manipur	0.0200*** (0.0023)	0.0855*** (0.0043)	-21538.1191*** (1918.3879)	0.0000	1.0000

Meghalaya	0.0405*** (0.0027)	0.0553*** (0.0020)	-4110.4570*** (1401.5680)	0.0000	1.0000
Mizoram	0.1066*** (0.0061)	0.0496*** (0.0030)	8407.8594*** (732.1178)	0.0000	0.0000
Nagaland	0.0151*** (0.0020)	0.0542*** (0.0059)	-12692.6904*** (2581.0740)	0.0000	1.0000
Sikkim	0.1021*** (0.0159)	0.0044* (0.0024)	10202.4902*** (942.9239)	0.0000	0.0000
Tripura	0.0472*** (0.0040)	0.0626*** (0.0126)	-8234.2783 (9943.9697)	0.2942	0.8529

Hansen J statistic
(overidentification test of
all instruments): 26.3880
Chi-square(25) P-value: 0.3871

IV Reset Test
(H_0 : $E(y|X)$ linear in X): 2.7600
Chi-square(3) P-value: 0.4302

R²: 0.9713 (uncentered)
0.9713 (centered)

Number of observations: 469

These results depict that our earlier conclusion regarding the effectiveness of VAT holds true for most of the states. But in comparison to our earlier results, we find that the situation has worsened for some of the states if we consider total sales tax revenues on commodities net of CST as our dependent variable. The improvement in tax collection measured as a decrease in the effective rate of taxation as well as an increase in the overall tax base as observed earlier, has either been dampened (e.g., for the state of Haryana) or totally reversed (for the state of Uttarakhand). For Delhi, we notice an increase in the effective rate of taxation post introduction of VAT. These results further our earlier claim about the overall ineffectiveness and indeed a regressive impact of VAT.

VI. Conclusion

In the Indian context, indirect taxes have a significant role in the fiscal structures of the states and during the last decade, the structure of the commodity taxes was amended to make way for state – level VAT. The primary objective of this move was to rationalize the system’s complex tax on tax cascades from production to final consumption thus resulting in a simple, transparent and more efficient system of taxation.

Our analysis measures some of the quantitative aspects of the introduction of VAT. We find that overall, the introduction of VAT has had a regressive impact on the tax base as well as a

hike in the effective rate of taxation. Our findings thus refute some of the claims that were forwarded in favor of VAT. Although our findings are rather pessimistic, there always remains the possibility that in the course of time, VAT will indeed catch up and even supersede sales tax in terms of a larger tax base with a lower effective rate of taxation.

Apart from the tax base and effective rate of taxation, there is also a need to concern ourselves with the impact of this change in the tax collection mechanism on other aspects of the economy which relate to growth and development (for example the impact on resource distribution and thus productivity, changes in consumption patterns etc.) – which also demands further empirical investigations. There is a large theoretical literature which deals with such matters. Emran and Stiglitz (2005) for example, show that in the presence of a substantial informal sector, a tax like VAT which falls more on the formal sector acts to deter the growth and development of the country as a whole. Keen (2007) also raises similar concern about the poor functionality of this new system of indirect tax collection in the presence of a large informal sector, especially in developing economies. India has a prominent and large informal sector. So, it becomes very relevant to further evaluate the prospects of VAT to discern any of its shortcomings, especially as India considers the introduction of a uniform, comprehensive Goods and Services Tax extending through the retail stage.

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