# Efficiency in Value Added Tax in Sub-National Governments in India: An Empirical Analysis

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## ABSTRACT

*The present study attempts to analyse whether the VAT efficiency has improved after its implementation. Further, we examine the major determinants of VAT efficiency for 17 non-special category Indian states for the period 2000-01 to 2014-15. Using random effect model (as suggested by Hausman test), the urbanization ratio, billing and collection efficiency, bank credit ratio and share of agriculture sector are found to have a favourable effect on VAT efficiency while the share of the unregistered manufacturing sector and share of services sector have an adverse impact on VAT efficiency. Besides, the study also reveals that tax efficiency has come down in the aftermath of the implementation of the VAT in India. As regards policy implication, initiatives by the government for the high level of urbanization, raising billing and collection efficiency, providing more bank credit and encouraging agricultural activities would enhance the VAT efficiency. Since the coefficient of the VAT dummy is negative in the model, the government may revise the existing tax system and adopt a suitable taxation system that solves the problem in the current tax structure.*

*Keywords: Value Added Tax; Urbanization, Bank Credit; Random effect; Hausman test.*

## 1.0 Introduction

Tax policies play a major role in the economy through their impact on both efficiency and equity. A good tax system should keep in view issues of income distribution while also endeavour to generate tax revenues to support government expenditure on public services and infrastructure development (Rao and Rao, 2006).

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Adding to this, a sound tax system should be simple, financially tolerable and elastic so that it can achieve the new necessities of the state. Further, an efficient taxation system should give rise to higher yield in order to finance higher outlay. With the help of such revenues, the government would be able to perform its increasing developmental and welfare activities.

The sales tax[1] as a form of commodity (goods) taxation system was the most significant component of the revenue from the indirect tax for the sub-national governments earlier (Ghosh, 1954; Purohit, 2001). The sales tax used to contribute sixty percent of sub-national governments revenue receipts[2]. The sub-national governments imposed the sales tax on the purchase or sale of a particular commodity within the country. What followed was that each sub-national government implemented its Sales Tax Act and levied the tax at various rates at the origin. Thus, a wide variety of Sales Tax rates for the same commodity in different states came into existence. Instead of unifying the nation into one common market, the system divided the country into several small markets and cascading effect (Purohit, 2001, Murty, 1995).

The current structure of Indirect tax and its regulatory mechanism deals with many problems. Cascading effect was the major problem in the sales tax system of sub-national governments. It ignores the input tax credit (ITC) or set off which has led to increased consumer prices (Purohit, 2001, Murty, 1995). Second, the existing system results in an uncontrolled incidence of the tax which from a chain of taxes that made the exact calculations of tax rate tough. Third, the multiplicity of rates had made the system very complicated. In some sub-national governments, there were as many as 12 rates; some of them have even 15 price categories ranging from one to twenty-five per cent. These multiplicities of rates were impediments on the business activities of the dealers who are the business entity; besides, it had increased the cost of compliance. As a result, it was not benefitting the Exchequer to raise more revenues. Some sub-national governments had started imposing goods tax in the form of additional sales tax or a surcharge, entry tax, luxury tax, entertainment tax which made the entire sales tax system a heterogeneous.

This complicated and varied tax system made the business entities to have their ancillary units as vertical integration of firms. As a result, the ancillary industries could not grow in these sub-national governments. This had adversely affected the trade and commerce. The multiplicity of rates, Central Sales Tax, and complex tax system encouraged the sub-national governments for the price war and prevented diversion of trade.

Finally, the existing system of commodity taxes was not neutral as it distorted the choice of both the producers and consumers. This resulted into severe economic

distortions. Given the above deficiencies and distortions in the existing structure, it was felt to have a system of value added tax (VAT) at the sub-national governments. Sales taxes in sub-national governments, which contributes approximately 60 percent of the own tax revenue, has much weakness due to lack of reforms have been attempted.

VAT[3] is a multi-stage levy, it is collected on sales at all stages of production and distribution process (Purohit, 2001). It also allows a credit to the registered firms for the tax paid on the purchases from registered supplier against the tax payable on sales. Consequently, the cascading phenomenon does not take place, and the same value is never taxed twice and no tax-induced distortion in favor or against vertical integration. It simplifies the indirect tax system of the economy. It promotes the neutrality of tax in behavior of consumer (relative prices are not affected) and behavior of producer (production technique not affected). It helps in reduction of tax evasion. However, in VAT system, tax invoices is mandatory. Therefore, the subsequent dealer would maintain their invoices to benefit from the tax deduction. This would enable the tax authority to cross check the declared transactions between taxpayers, consequently reducing the propensity to evade tax. It is transparent, and the total burden of tax on a particular commodity from its transactions can be ascertained. It also enhances the international trade tax neutrality. Different countries having diverse forms of VAT system and the related disadvantages are presented in Table 1.

**Table 1: Comparison of Federal VAT System**

| Nature of VAT | Country Examples | Disadvantages |
|---|---|---|
| Independent VATs at Centre and States | Brazil, Russia, Argentina | Differences in base and rates weaken administration and compliance. Interstate transactions difficult to manage. |
| VAT levied and administered at Centre | Australia, Germany, Austria, Switzerland, etc. | State government relieved of responsibility of raising taxes which also takes away fiscal discretion of States |
| Dual VAT | Canada and India today | A combination of the above two and hence limits both their disadvantages |
| "Clean" dual VAT | India's GST | Common base and common or similar rates facilitate administration and compliance, including for inter-state transactions, while continuing to provide some fiscal autonomy to States |

*Source: World Bank (2015)*

VAT has been implemented after mutual coordination among sub-national governments and the Central government, on 1st April 2005, at the sub-national level in India, although, Haryana (HR) was the first Indian sub-national governments that

individually replaced the sales tax with VAT system on 1st April 2003. Whereas, 20 sub-national governments such as, Andhra Pradesh (AP), Arunachal Pradesh, Assam, Bihar (BR), Delhi, Goa (GO), Himachal Pradesh, Jammu and Kashmir, Karnataka (KR), Kerala (KE), Manipur, Maharashtra (MH), Meghalaya, Mizoram, Nagaland, Odisha (OD), Punjab (PB), Sikkim, Tripura, and West Bengal (WB) have substituted sales tax with VAT on 1st April, 2005 and Uttaranchal on 1st October, 2005. Chhattisgarh (CHH), Gujarat (GJ), Jharkhand (JH), Madhya Pradesh (MP) and Rajasthan (RJ) have implemented VAT on 1st April 2006, Tamil Nadu (TN) on 1st January 2007 and finally, Uttar Pradesh (UP) on 1st January 2008. In fact, the VAT was introduced in India was adopted as stop-gap arrangement for implementation of the GST in future[4].

Although the journey of VAT in India crossed more than ten years, no exhaustive research on the VAT efficiency has been made yet. Understanding various problems in the Indian tax structure, the present study intends to analyse the major determinants of VAT efficiency at sub-national level for the period 2000-01 to 2014-15.

The rest of the paper is organized as follows. Section 2 outlines the analytical framework, while section 3 explains the issues related to data and methodology on the empirical exercise undertaken in the study. Empirical results are presented in section 4, and section 5 concludes with policy implications.

## 2.0 Analytical Framework

The analytical framework of this paper discusses the inter-linkages between VAT and other variables namely level of urbanization (URB), billing and collection efficiency (BCE), ratio of bank credit (CRE), ratio of unregistered manufacturing sector to GSDP (UNMNF), share of the services sector to GSDP (SERV) and share of agriculture to GSDP (AGRI).

Higher urbanization (URB) leads to higher average consumption ratio[5]. As VAT is a consumption tax, high level of urbanization raises VAT efficiency through high consumption rate (Nambiar and Rao, 1972; Sen, 1997; Sen-Gupta, 2007; Nepram, 2011; Sen, 2015). In urban areas, the normal commercial transaction happens against the invoice. This makes the seller declare the output tax liability and add to the tax yield. Also, registered dealers can't get input tax credit (ITC) if the input is not purchased from another registered dealer. This applies to both manufacturers and traders. Therefore, the tax payable/liability spreads across the value chain. Hence, the estimated coefficient sign of high urbanization ratio is expected to be positive in the model.

Billing and Collection efficiency (BCE) represent the overall efficiency of electricity distribution sector. It represents how much electricity is billed out of the total

supply of energy and how much is collected from the billed energy. We have considered only power distribution sector because the transmission sector of India is one of the productive sectors as compared to the international benchmark. However, in the distribution sector, the billing and collection efficiency is very high. The billing & collection efficiency in India is reported at 74%, indicating that Aggregate Technical and Commercial Losses is 26%. The billed energy can give an idea about the value addition from the consumption of electricity. If value addition is made by suppressing the billing efficiency regarding the inefficient use of electricity, power theft and unauthorized connections, then measuring the value addition in currency terms will be erroneous. Therefore, higher the billing and collection efficiency, the accuracy of output tax can be ascertained. This will lead to high yield. Besides, lower billing efficiency through power theft, unauthorized connections will encourage the tax paying dealers to sell inputs without the invoice. This will further push down the VAT efficiency. This entirely affects the value chain for which tax yield declines. Similarly, a rise in billing and collection efficiency reduce AT&C loss and improves the financials of the DISCOMS. High billing and collection efficiency raises the revenue of the tax paying dealers and encourages them not to sell input without an invoice. Hence, its expected sign is to be positive in the model.

Indian economy is a banking oriented economy and the outstanding bank credit to GSDP ratio (CRE) was 79% in 2013-14[6]. Bank credit plays a pivotal role to achieve sustained high economic growth. Term loan, working capital or bills of exchange facilitate the business transaction either in the form of acquiring capital assets or to run a day to day business or to use the platform to get their payment earlier so that their day to day business activities will not be affected. Bank credit is critical for value addition in business activity. The banking system interacts with real economic activity through its various functions by which it facilitates economic value addition. Hence, bank credit is expected to have a positive effect on the VAT efficiency.

In the manufacturing sector, most of the manufacturers are unregistered dealers[7] who do not have tax registration number, and usually, they make their transactions with other non-registered manufacturers. They did not come under the tax net. Neither they declare their output tax nor do they state their source of purchases. As a result, they escape from the tax net. Hence, higher unregistered manufacturing sector to GSDP (UNMNF) would reduce the VAT efficiency (Mukherjee and Mukherjee, 2015; Sen, A., 2015).

VAT is mainly associated with commodity sector. The services sector do not come under the scope of VAT. In Indian constitution, the services sector is not part of the VAT regime and collection of revenue from this sector is accrued by the national

government. Since no VAT is generated from this sector, the rise in service sectors share in GDP (SERV) may adversely affect the VAT efficiency (Mukherjee and Mukherjee, 2015; Sen, A., 2015).

Farm mechanization is promoted by both government and private sectors. Hence, the purchase of mechanized products to use in agricultural production is subjected to VAT. As a result, it adds to VAT revenue. In addition, the rise in per capita agriculture income increases the average consumption of the commodity and thereby raises more VAT revenue (Oommen, 1987; Sen, T.K.; 1997; Stotsky and Woldemariam, 1997; Jha et al., 1999; Tanzi, 2000; Nepram, 2011; Mukherjee and Mukherjee, 2015; Sen, A., 2015). Hence, the coefficient sign of the share of agriculture in GDP (AGRI) is expected to be positive in the model.

Based on the above discussion, to assess the role of various factors influencing Value Added Tax (VAT), the following model has been constructed.

$$VAT = f (URB, BCE, CRE, UNMNF, SERV, AGRI, DVAT) \quad \ldots\ldots..(1)$$
$$(+) \quad (+) \quad (+) \quad (-) \quad (-) \quad (+) \quad (-)$$

where,

VAT: Ratio of sales tax to GSDP (Evat) as a proxy of VAT efficiency

URB: Urbanization ratio is defined as the total number of urban population as the proportion of total population.

BCE: It is defined as billing and collection efficiency in the electricity distribution sector.

CRE: It is the total outstanding net bank credit by commercial banks relative to GSDP.

UNMNF: Ratio of the unregistered manufacturing sector to GSDP is expressed as UNMNF.

SERV: Share of the services sector to GSDP

AGRI: share of agriculture to GSDP (ARGI)

DVAT: To analyze the effect of tax policy change, we introduced a dummy that has the value zero before the year 2005 and one after the year 2005.

The above model is used to empirically assess various factors influencing VAT efficiency in case of 17 non-special category states of India for the period 2000-01 to 2014-15.

## 3.0 Data and Methodology

We used panel regression techniques such as fixed effect, random effect, and Hausman test to assess the various determinants of VAT efficiency in Indian context. All data for the period 2000-01 to 2014-15 for 17 non-special category Indian states have

been obtained from various sources such as various volumes of Basic Statistical Returns of Scheduled Commercial Banks (SCBs) in India, Handbook of Statistics on Indian Economy published by Reserve Bank of India (RBI); various reports on the Performance Report of Sub national governments Power Utilities published by Power Finance Corporation Limited, Central Electricity Authority, Government of India.

Based on the above discussion, following function assessing various determinants of VAT efficiency has been estimated using panel regression technique for the period 2000-01 to 2014-15 for 17 non-special category Indian states.

$$E_{vat} = \beta_0 + \beta_1 URB_t + \beta_2 BCE_t + \beta_3 CRE_t + \beta_4 UNMNF_t + +\beta_5 SERV_t + \beta_6 AGRI_t + \beta_7 DVAT_t + \varepsilon_t$$

$$\dots \dots \dots (2)$$

where, '$\beta_0$' indicates the autonomous effect on VAT efficiency; $\beta_1$, $\beta_2$, $\beta_3$, $\beta_4$, $\beta_5$, $\beta_6$, and $\beta_7$ denote the coefficients of variables used in the model; and '$\varepsilon_t$' shows the residual of the model.

## 3.1 Measurement of value added tax efficiency

Analysis of Tax efficiency in VAT at regular interval is required for risk identification, compliance risk management, identifying the areas of leakages, tax evasion, and frauds. This helps in framing an effective fiscal policy in the sub-national governments.

It was expected that the VAT turns out to be a more efficient system of commodity taxation compared to the traditional one. It creates two-way benefits to the economy. First, it makes the production more efficient by avoiding taxation of intermediate inputs and associated cascading of taxes in the supply chain. Second, it is also expected to fetch higher revenue to the exchequer by providing the incentive to firms in declaring their transaction record and thereby creating an audit trail. This, in turn, helps to check tax evasion and divides the VAT liability across the supply chain. As a result, even if revenue is lost at one part of the supply chain due to fraud, it helps collection of the rest of the anticipated income on the value of the product ( Mukherjee and Mukherjee, 2015).

Value Added Tax (VAT) to Gross State Domestic Product (GSDP)[8] of sub-national governments are taken as a measure of tax efficiency in our analysis. Here, GSDP is considered as a measure of tax base though revenue from VAT comes from mainly from secondary sector. As most of the outputs of Primary Sector are exempted from VAT and Service Tax is collected by the national government following the constitutional provisions of Government of India. C-efficiency also measures VAT

efficiency. C-efficiency is the ratio of actual VAT revenue to the potential VAT revenue (Keen, 2013). This is expressed as:

$$E^c \equiv \frac{V}{\tau_s C}$$ ......(3)

Where $E^c$ specifies as C-efficiency of VAT, $\tau_s$ represents the standard rate of the VAT. This standard rate is often called as "Revenue Neutral Rate." $C$ indicates the consumption base of the (exclusive VAT) and $V$ denotes the actual VAT revenue.

The $E^c$ will be maximum 100% if all the consumption basket which are subjected to VAT at the standard rate. However, since this is far from the reality, the measurement of VAT efficiency over the time and the jurisdiction is getting importance from the exchequer point of view as well as both academic and practitioner perspectives.

Keen, (2013), has recognized VAT to GSDP as efficiency metric and decomposed VAT to GSDP ratio into C-efficiency and consumption ratio[9] by decomposing VAT to GSDP ratio. WE have customized this decomposition at the sub-national government level. This is presented below:

$$\frac{VAT}{GSDP} = \tau_s \times E^c \times \frac{C}{GSDP}$$ ........(4)

This implies VAT to GSDP ratio as an efficiency measure will be equal to C-efficiency if all consumption subjected to VAT yields revenue by applying a uniform rate equal to standard rate. Implicitly, Keen (2013) assumes no exemption or zero rates[10]. He argues both exemptions and zero rates distort input choices. In this decomposition of tax efficiency, $\frac{C}{GSDP}$ is crucial as it decides the proportion of consumption in VAT basket is in GSDP. GSDP at sub-national government level and GDP at the national level are taken as the base for measuring tax efficiency. Since VAT is a commodity (Goods) tax system, it does not include services sector, and most of the agricultural outputs are exempted from VAT. Therefore, to identify the appropriate base for measuring tax efficiency, we have examines GSDP, Manufacturing, and Agriculture Sector for selecting an appropriate sector base for measuring VAT efficiency.

At preliminary level, we have plotted the growth in the commodity tax revenue and the growth in GSDP to examine the suitable base for VAT efficiency (Appendix, Fig.1, Fig.2, Fig.3 and Fig.4). From the graphs, it appears that the GSDP is the first candidate for the base for measuring efficiency.

Also, we have adopted three models taking these three sectors for the selection of appropriate base. We have employed following bivariate econometric models,

$$lnCTAX_t = \alpha_1 + \beta_1 lnGSDP_t + \varepsilon_{t1}$$ … … …(5)

$$lnCTAX_t = \alpha_2 + \beta_2 lnAGRI_t + \varepsilon_{t2}$$ … … …(6)

$$lnCTAX_t = \alpha_3 + \beta_3 lnMNF_t + \varepsilon_{t3}$$ … … …(7)

$\alpha_1$, $\alpha_2$, and $\alpha_3$, are presented as autonomous effect and $\beta_1$, $\beta_2$ and $\beta_3$, are the coefficients of each sector, $\varepsilon_{t1}$, $\varepsilon_{t2}$ and $\varepsilon_{t3}$ are the residuals (disturbance) term in the models.

lnCTAX (the natural log of commodity tax) is taken as the dependent variable. lnGSDP is the natural log of GSDP. lnAGRI (natural log of agriculture) and lnMNF (the natural log of manufacturing) at a point in time t' are the independent variables. The empirical results are presented in Table 2.

**Table 2: Selection of Tax Base**

| | | Dependent Variable: lnCTAX | | | | |
|---|---|---|---|---|---|---|
| **Model** | **Independent variable** | **Coefficient** | **t-stat.** | **R-squared** | **Akaike info criterion (AIC)** | **Mallows's $C_p$** |
| Model -1 | lnGSDP | 1.043*** | 41.867 | 0.924 | 0.539 | 2.00 |
| Model -2 | lnARGI | 0.746*** | 22.486 | 0.797 | 1.523 | 2.00 |
| Model -3 | lnMNF | 0.868*** | 24.207 | 0.816 | 1.421 | 2.00 |

*\*\*\* indicates the 1% level of significant level.*

We have used $R^2$, Akaike info criterion (AIC) and Mallows's Cp to choose the appropriate base. Among the all four models, presented in Table-1, Model-1 is the best-fitted model because of high $R^2$ with low AIC value (Mallows's $C_p$ is equal in all the models). Therefore, we can conclude that GSDP is the best instrument to measure the VAT efficiency at the sub-national level in India.

Also, Table 2 demonstrates that the elasticity of VAT is 1.04 percent, 0.75 percent and 0.87 percent to GSDP, Agriculture and Manufacturing sector respectively. From the above three models, only GSDP is highly elastic on VAT and rest are inelastic. Since GSDP includes all the economic activities of the sub-national governments, the influence or elasticity of GSDP on commodity tax is more accurate.

## 4.0 Results and Analysis

Before going for estimation, we have observed the descriptive statistics of all variables in the model (Table 3). In the first step, we performed the Hausman test to choose between fixed effect and random effect model. Hausman test is carried on the null hypothesis that random effect estimators are more efficient than fixed effect model against the alternative hypothesis that fixed effect estimators are more efficient that random effect. The results of Hausman test is presented in Table 4.

**Table 3: Descriptive Statistics**

| Variables | | Mean | Std. Dev. | Min | Max | Observations | |
|---|---|---|---|---|---|---|---|
| *Urbanization* | overall | 0.57 | 0.14 | 0.29 | 0.93 | N = | 255 |
| | between | | 0.13 | 0.37 | 0.91 | n = | 17 |
| | within | | 0.05 | 0.45 | 0.68 | T = | 15 |
| *Billing & Collection Efficiency* | overall | 0.67 | 0.15 | 0.18 | 0.94 | N = | 255 |
| | between | | 0.12 | 0.42 | 0.83 | n = | 17 |
| | within | | 0.09 | 0.42 | 1.09 | T = | 15 |
| *Bank Credit* | overall | 0.37 | 0.25 | 0.09 | 1.21 | N = | 255 |
| | between | | 0.22 | 0.15 | 1.01 | n = | 17 |
| | within | | 0.11 | -0.08 | 0.73 | T = | 15 |
| *Unregistered Manufactured* | overall | 0.05 | 0.02 | 0.02 | 0.08 | N = | 255 |
| | between | | 0.01 | 0.02 | 0.07 | n = | 17 |
| | within | | 0.01 | 0.02 | 0.07 | T = | 15 |
| *Services* | overall | 0.49 | 0.08 | 0.32 | 0.67 | N = | 255 |
| | between | | 0.07 | 0.37 | 0.62 | n = | 17 |
| | within | | 0.03 | 0.41 | 0.57 | T = | 15 |
| *Agriculture & Allied activities* | overall | 0.22 | 0.07 | 0.05 | 0.39 | N = | 255 |
| | between | | 0.07 | 0.08 | 0.31 | n = | 17 |
| | within | | 0.03 | 0.15 | 0.32 | T = | 15 |

**Table 4: Hausman Test for Random Effects**

| Chi-Sq. statistic | Chi-Sq. d.f. | Prob > Chi$^2$ | Decision |
|---|---|---|---|
| 11.11 | 7 | 0.13 | Go for Random Effect |

Hausman test result suggested that the random effect model would be relatively efficient compared to fixed effect model for the empirical analysis. Therefore, we estimated the model using random effect regression technique. Table 5 presents the estimated results using random effect method. The coefficients of all the variables are statistically and highly significant (at 1 percent level) in the model. The signs of the coefficients of these variables are as per their theoretical expected signs. The urbanization ratio, billing and collection efficiency, bank credit ratio and share of agriculture sector have the favourable effect on VAT efficiency while the share of the

unregistered manufacturing sector and share of services sector have the adverse impact on VAT efficiency.

**Table 5: Panel Random Effects Estimation for VAT Efficiency**

| Dependent variable: Sales Tax as proportion to GSDP | | | |
|---|---|---|---|
| *Variables* | **Coefficient** | **t-statistic** | **Prob.** |
| *C* | 0.225*** | 3.30 | 0.00 |
| *URB* | 0.056*** | 7.01 | 0.00 |
| *BCE* | 0.018*** | 2.85 | 0.00 |
| *CRE* | 0.026*** | 7.30 | 0.00 |
| *UNMNF* | -0.229*** | -4.96 | 0.00 |
| *SERV* | -0.049*** | -4.29 | 0.00 |
| *AGRI* | 0.033*** | 3.38 | 0.00 |
| *DVAT* | -0.008*** | -4.80 | 0.00 |
| | | | ***R-squared:*** *0.52* |
| | | | ***F-statistic:*** *37.46, Prob.(0.00)* |

*Note: \*\*\* indicates the 1% level of significant*

The coefficient of the high level of urbanization is positive and statistically significant in our model. A 10% rise in urbanization ratio leads to a 5% increase in VAT efficiency. High level of urbanization results in high average consumption ratio. This, in turn, raises tax yield as VAT is a consumption based tax. Besides, the regular commercial transaction in urban areas occurs against the invoice. Due to this the trader declares the output tax liability and adds to the tax yield. Further, the registered dealers can avail input tax credit if they purchase input from other registered dealers. This applies to both manufacturers and traders. Therefore, the tax liability spreads across the value chain. Hence, high level of urbanization has a favourable effect on VAT efficiency.

In our model, billing & collection efficiency has a positive impact on VAT efficiency. It is estimated that 10% rise in billing and collection efficiency will lead to 1.8% increase in VAT efficiency. An efficient billing and collection system reduce aggregate technical and commercial (AT&C) loss through power theft and unauthorized connections. Hence, it improves the financials of the DISCOMS in general. Thus, improvement in billing and collection activities has an immediate impact on the revenue generation of a service provider. Revenue accumulation through high billing and collection efficiency do not encourage the tax paying dealers to sell input without the invoice. This raises the VAT efficiency and also strengthens the value chain in an economy.

The bank credit ratio is positive and statistically significant in the model. It is observed that 10% rise in credit to GSDP ratio will enhance the VAT efficiency by 2.6%. Bank credit raises VAT efficiency by facilitating the business transaction. The banking system interacts with real economic activity through its various functions. This, in turn, enables the economic value addition. Hence, bank credit under the financial system plays a critical role in inducing economic growth.

From the empirical results, it is observed that large unregistered manufacturing sector has an adverse effect on VAT efficiency. The rise in the unregistered manufacturing sector to GSDP by 10% will reduce the VAT efficiency 2.30%. It is because manufacturing industries in India possess many unregistered dealers. These dealers do not hold any tax registration number and carry out their transactions with other non-registered manufacturers. They are not brought under the tax net. Hence, higher unregistered manufacturing sector to GSDP would reduce the VAT efficiency

In our model, the share of services sector has a negative impact on VAT efficiency and VAT efficiency drops by 0.5% for 10% rise in the share of services sector in GDP. Since VAT deals with the commodity market, the service industry is out of the purview of VAT. The share of services sector in GDP of India has increased to 62.40% during 2005-06 to 2014-15 from 57.40% witnessed during 1998-99 to 2004-05 and 51% recorded in 1991-92 to 1997-98[11]. Since the contribution of services sector is the highest in GDP and has been rising over the years, it has an adverse effect on the revenue yield of VAT. It is because no VAT revenue is generated from this sector. Hence, the share of services sector has an adverse effect on the VAT efficiency in the model.

The share of agriculture relative to GDP has a positive effect on VAT efficiency in the model. It can be interpreted that a 10% rise in the share of agriculture in GDP increases VAT efficiency by 0.33%. The share of agriculture has declined from 47.5% in 1991-92 to 1997-98 to 22.40% in during 1998-99 to 2004-05 and to 18.20%. Despite a decrease in the share of agriculture sector in GSDP from 27.80% in 2005-06 to 2014-15[12], it increases the VAT efficiency. This is fascinating as most of the agricultural commodities are exempted items. The answer lies in farm mechanization. As farm mechanization is promoted by both government and private sectors, the purchase of mechanized products for its use in agricultural production is subjected to VAT. As a result, it adds to VAT revenue. Besides, the rise in per capita income of in agriculture is calculated at 11.75%[13] at current prices during 2005-06 to 2014-15. This growth in per capita income in the agricultural sector would have increased the average consumption of taxable commodities because of changing pattern consumption and thereby, more VAT revenue.

The coefficient of the VAT dummy is found to be negative and statistically significant in the model. This implies that tax efficiency has come down in the aftermath of the implementation of the VAT in India. The study supports the findings of Tripathi et al. (2011) and Roy et al. (2010) while differs from the findings of Khan & Shadab (2013) and Sen (2015). It may be because of the following reasons. If we analyze the transfer on account of grants by the Centre to all sub-national governments during both 12th and 13th Finance Commission (FC), the grants have increased by 6.66 times and 3.09 times respectively over 11th Finance Commission (2000-2005). The transfer of huge receipts to the sub-national governments might have adversely affected their tax effort index to raise revenue through VAT. Also, huge market imperfection exists with informal sectors of production in the sub-national governments of India. This may be another reason behind the low VAT efficiency in India. This has come out in our study, wherein, in the post-VAT regime, the tax efficiency on account of Central Transfer (both shared tax and grants) has incrementally come down by 0.08% for 10% rise in the central transfer. Though the magnitude of decline is very less, it is statistically significant. Therefore, the decline in VAT efficiency is established after its implementation in 2005.

## 5.0 Conclusion, Policy Implication and Way Forward

Higher degree of urbanization, high billing & collection efficiency in the electricity distribution segment, higher credit penetration (high credit to GSDP ratio), decline in the share unregistered manufacturing sector in GSDP and larger share of agriculture in GSDP induce higher VAT efficiency in sub-national governments. Our VAT efficiency model suggests for more urbanization as well as reducing distribution losses in power sector. This will help in underinvesting of tax liability. The credit/loans from the banking sector will be instrumental in creating more value added business. As the agricultural produce goes up, the income generation in the agricultural sector will go up. Because two third of the population in India are still employed in the farm sector, the rise of revenue will increase their average consumption. As a result, it will give a real boost to the aggregate consumption of sub-national governments. As consumption increases, the VAT revenue will also go up along with the increase in VAT efficiency.

## Endnotes

1.  Sales tax was first levied in India as a form of commodity tax in the province of Bombay on sales of tobacco in a limited jurisdiction. In 1945, a general sales tax legislation was introduced by Bombay and was enacted as the Bombay Sales Tax Act of 1946 March 1946;

The Bombay Sales Tax Act was passed on the basis of the last stage of the sale of any goods. Besides, origin based Central Sales Tax (CST) on sales or purchases of goods in the course of inter-State trade or commerce was enacted which came into force on in 1957. Revenue generated from both sales tax and CST is retained by the sub-national governments in India.

2. Source: National Account Statistics, Government of India.

3. It is a broad-based tax covering the value added of each commodity by a firm during all stages of production and distribution. Consumption based VAT variant is extensively used in the world. It allows deductions for all business purchases including capital assets. It neither distinguishes between capital and current expenditures nor specifies the life of assets or depreciation allowances for different assets. This form is neutral between methods of production and decision to save or consume. This is most favorable variant among the all three variants of VAT. It does not affect decisions of regarding investment because the tax on capital goods is also set-off against VAT liability. It is more in harmony with the destination principle. Also, consumption variant is better in administrative expediency because it simplifies tax administration by obviating the need to distinguish between purchases of intermediate and capital goods on the one hand and consumption goods on the other.

4. State Finances A Study of Budgets of 2016-17

5. Consumption Ratio: Consumption as proportion of Income

6. Reserve Bank of India.

7. Unregistered dealers do not have Tax Identification Number(TIN) provided by the Government.

8. GSDP is the proxy of income base of the sub-national governments.

9. $\frac{V}{Y} = \tau_s \, E^c \left(\frac{C}{Y}\right)$

10. Taxable commodities are declared as zero tax rate under certain circumstances i.e. taxable exportable commodity

11. ibid

12. Ibid, source: Reserve Bank of India

13. Compound Average Growth Rate(CAGR)

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**Appendix**

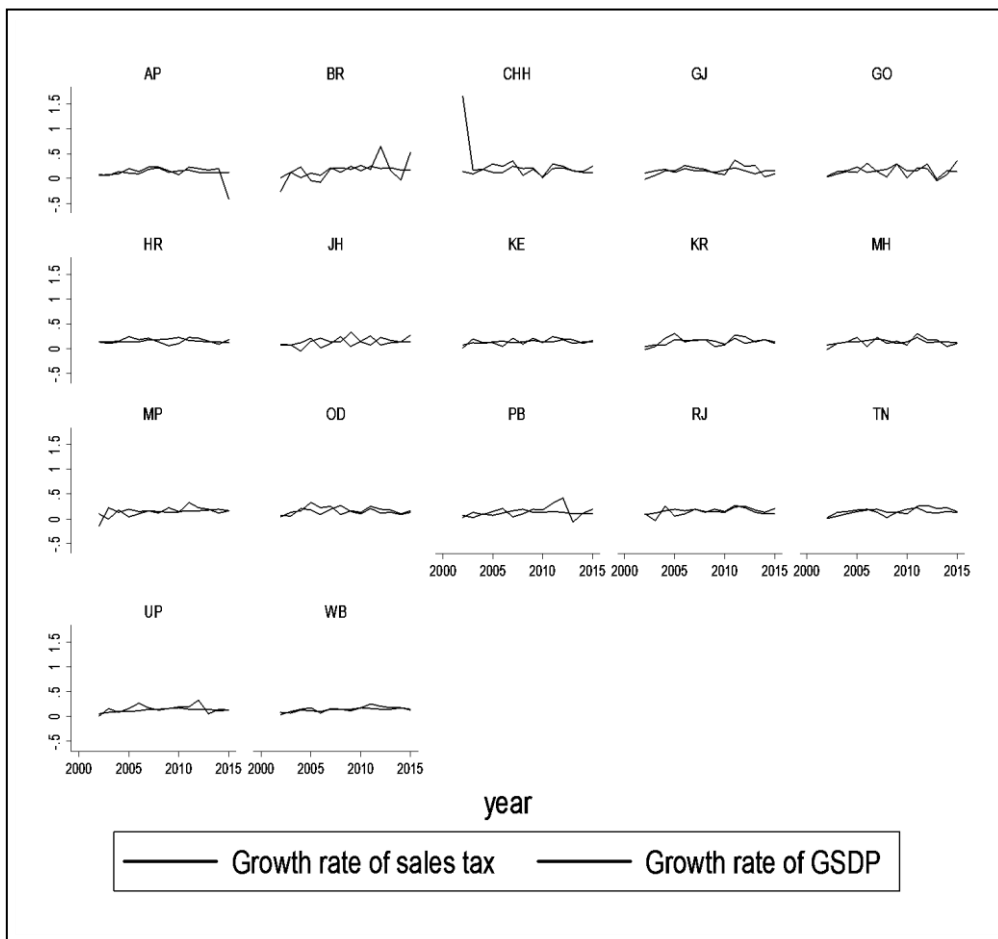**Figure 1: Trends in growth in Commodity Tax Revenue and GSDP**

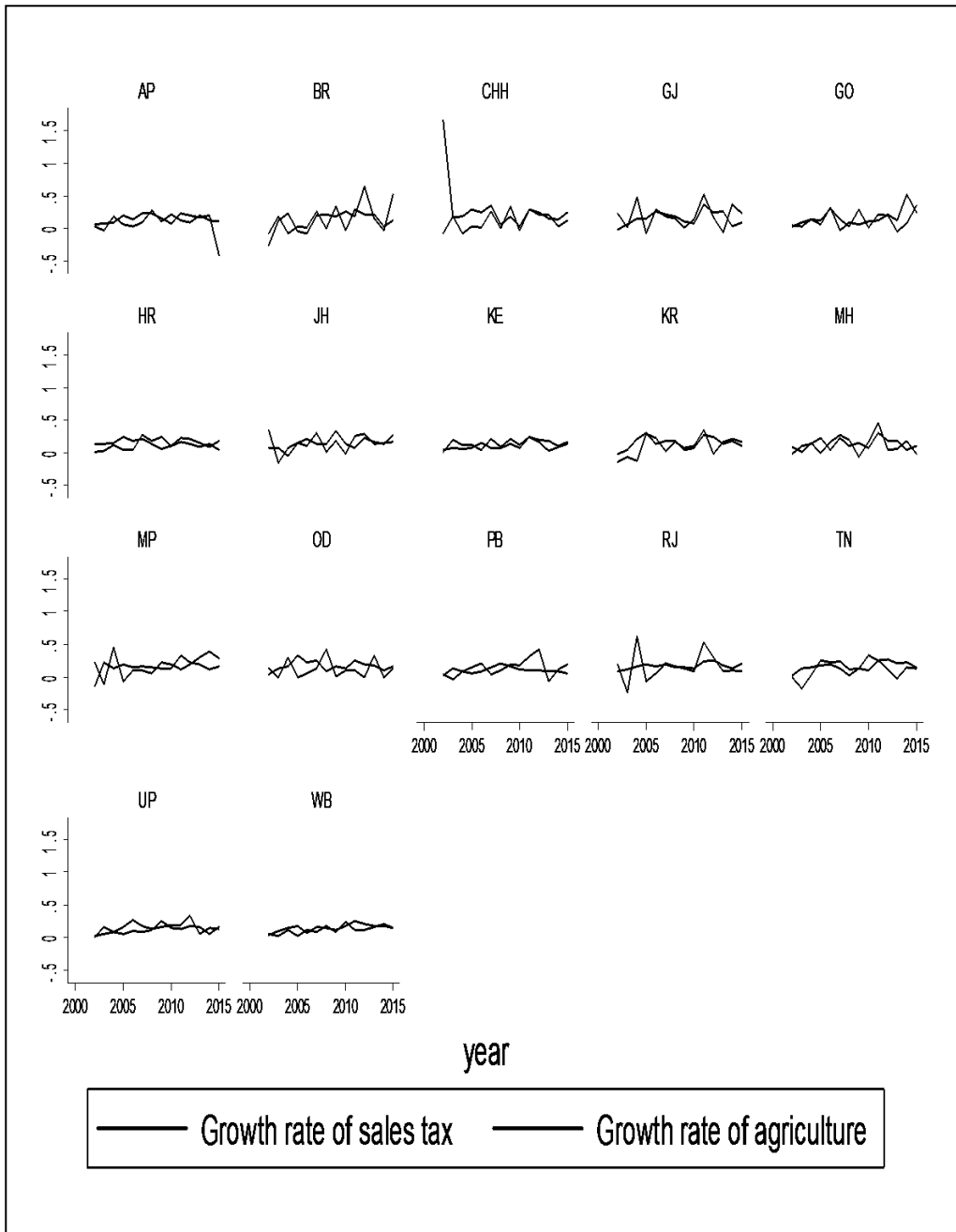**Figure 2:  Trends in growth in Commodity Tax Revenue and Agriculture**

**Figure 3: Trends in growth in Commodity Tax Revenue and Manufacturing**
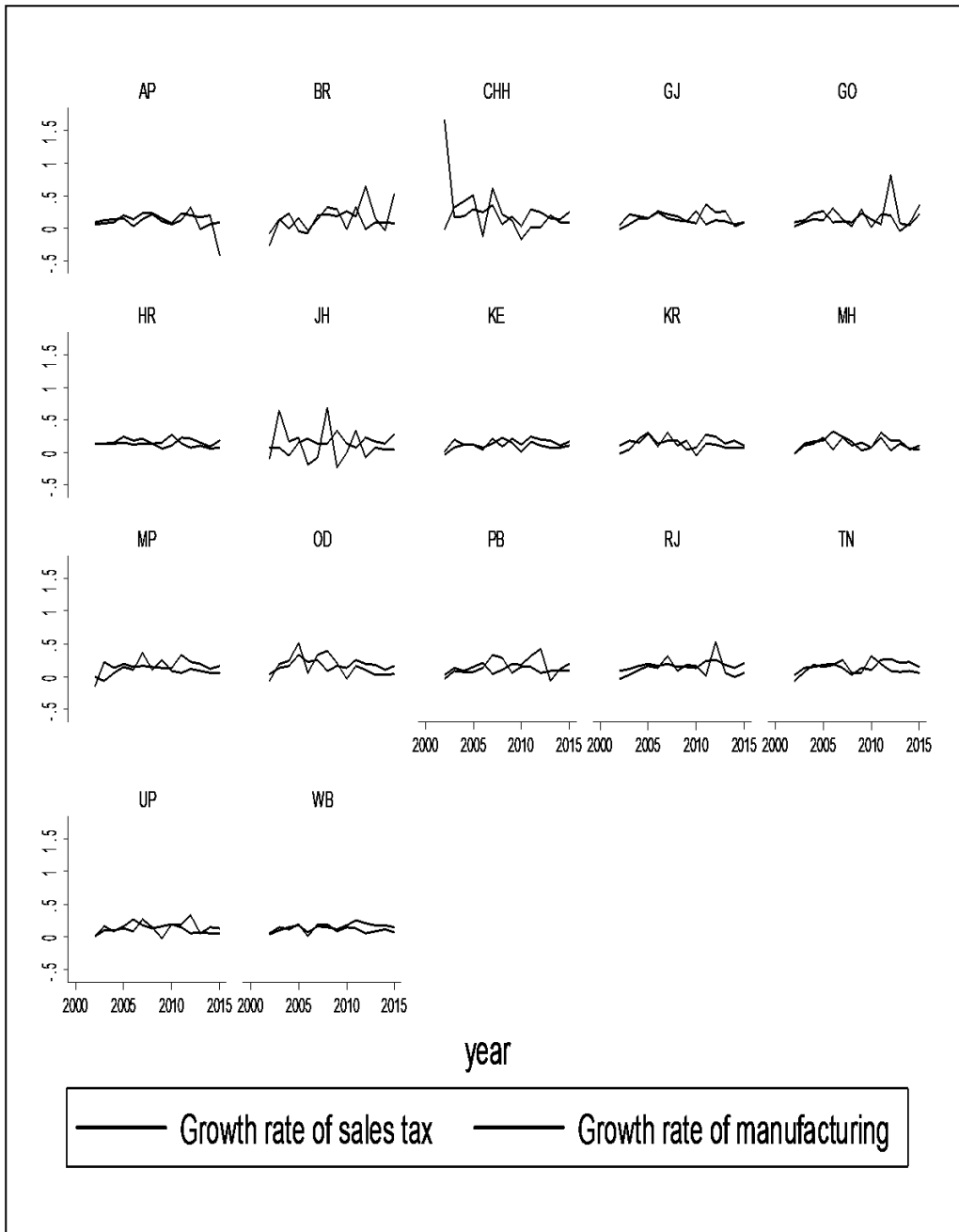


Growth rate of sales tax          Growth rate of manufacturing

**Figure 4: Trends in Sales Tax Revenue and Services**