Fiscal Decentralization, the Composition of Public Spending, and Regional Growth in India[*]

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Abstract

In this paper, we present an analytical model for examining the growth impact of intergovernmental and intersectoral allocation of public expenditure. The model helps us quantify the role of fiscal decentralization in regional economic growth and identify whether central and local allocation of public spending among various sectors are growth-enhancing. Applying our analytical framework to a panel data set of 16 major states in India, we have found that, in many cases of our regressions, fiscal decentralization is positively, and even statistically significantly, associated with state economic growth. The state allocation of public spending in various sectors is broadly consistent with "growth-maximizing", whereas increases in the central allocation of its budget among development projects, nondevelopment projects, and social and community services by cutting the center's spending on all other functions can promote regional growth. Furthermore, the distortionary effect of the state tax in India is dominated by the productive effect of tax-financed public spending, whereas the reverse holds for the central tax.

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1. Introduction

Using a panel data for 16 major Indian states from 1970 to 1994, we quantitatively evaluate the effect of public expenditures on local economic growth in India from a few perspectives. First, we seek to understand whether intergovernmental fiscal arrangements in expenditure and tax assignment have any bearing on state economic growth. Specifically, we look at the growth effect of decentralization in revenue collection and expenditure. This exercise can be viewed as an empirical test of the efficiency proposition of fiscal decentralization in a large, federal country. In this exercise, we also explicitly control the effect of both central and state taxes on regional economic growth.

Second, we broaden the existing framework of macro public expenditure analysis[1] and examine the association between economic growth and the composition of public spending by both the central and state governments. In India, both the central and state governments have been facing hardening budget constraints. Budget-cutting involves not only the cut in the aggregate government spending, it also demands a clear picture on the budget sizes of central and local governments. Shall we cut the central government budget more than the local budget? Which component of public expenditures should be cut for both

[1]Currently there have been three approaches to studying the growth impact of public expenditures on economic growth:(1)Aschauer (1989) and Barro (1990), among many others, have studied the impact of aggregate government spending on growth and productivity. In those studies, government spending is divided either into aggregate consumption and aggregate investment or into aggregate spending in different sectors. The growth impact of various spending by different levels of government has not been carefully examined. (2)Devarajan, Swaroop and Zou (1996) have taken the first step toward a systematic examination of the relationship between the composition of public expenditure and economic growth. While they have focused on the growth effects of various central government's expenditures, they have largely ignored the corresponding roles of state and local government spending in the growth process. (3)Finally, Davoodi, Xie and Zou (1995), Zhang and Zou (1996), and Davoodi and Zou (1996) have explored the growth effect of aggregate public spending by different levels of government along the line of fiscal-federalism arguments, but they have not looked into the composition of various public spending by different levels of government. This paper unifies and extends the three above-mentioned approaches by dealing with the growth impact of the allocation of public expenditures among multiple sectors with multiple levels of government.

the center and localities? These hard choices and realities depend on the relative contributions of public spending by different levels of government to economic growth.

Third, fiscal decentralization, the devolution of fiscal power from national government to subnational governments, is increasingly viewed as part of a package to reform the inefficient public sector, increase competition among subnational governments in efficient delivery of public services, and escape from low economic growth (Bahl and Linn, 1992; Bird and Wallich, 1993, Oates, 1993). In the decentralization process, the knowledge of the productivity of aggregate public spending or the productivity of central government expenditures is not sufficient, because we need to know the relative productivity and relative efficiency of different public expenditures by different levels of government in order to achieve optimal expenditure assignments for each level of government.

In section 2, we provide a general, theoretical framework to integrate the allocation of public expenditures among various public sectors and among different levels of government. In section 3, as an example of practical implementation of the general analytical framework, we first present a picture of public expenditures by sector and level of government in India from 1970 to 1994. In section 4, we use the data on sixteen Indian states to investigate the effects on state economic growth of various public expenditures by both the central government and state governments. We conclude this paper in section 5.

2. Analytical framework

We develop a theoretical model that links multiple sectors of public spending by multiple levels of government to economic growth in this section. To be as general as possible, the model assumes that there are three levels of government: federal, state, and

local. In the model fiscal decentralization is defined as spending by each level of government as a fraction of total government spending. For example, fiscal decentralization increases if spending by state and local governments rises relative to spending by the federal government. Furthermore, for each level of government, there are various public expenditures. The model then allows us to analyze the efficiency gains of fiscal decentralization and to evaluate the growth impact of various public spending by the three levels of government.

Following Barro (1990), we begin with an endogenous growth model consisting of a production function with multiple inputs: private capital and multiple public spending by the three levels of government. Let *k* be private capital stock, *g* the total government spending, *f* the vector of federal government spending, *s* the vector of state government spending, and *l* the vector of local government spending:

$$\begin{aligned} f &= (f_1, \ldots, f_i, \ldots, f_I) \\ s &= (s_1, \ldots, s_j, \ldots, s_J) \\ l &= (l_1, \ldots, l_h, \ldots, l_H) \end{aligned} \tag{1}$$

and

$$\sum_{i=1}^{I} f_i + \sum_{j=1}^{J} s_j + \sum_{h=1}^{H} l_h = g \tag{2}$$

The production function is a nested Cobb-Douglas[2]

$$y = k^{\alpha}[\prod_{i=1}^{I} f_i^{\beta_i}]^{\beta}[\prod_{j=1}^{J} s_j^{\gamma_j}]^{\gamma}[\prod_{h=1}^{H} l_h^{\omega_h}]^{\omega} \tag{3}$$

where *y* is per capita output, $1 > \alpha > 0$, $1 > \beta > 0$, $1 > \gamma > 0$, $1 > \omega > 0$,

[2] The use of more general functional forms such as the CES would not alter our analysis qualitatively; see Devarajan, Swaroop and Zou (1995); and Davoodi, Xie and Zou (1995).

$\alpha + \beta + \gamma + \omega = 1, \quad \beta_i > 0 \quad \text{for} \quad i = 1,\ldots,I, \sum_i \beta_i \leq 1, \quad \gamma_j > 0 \quad \text{for} \quad j = 1,\ldots,J,$

$\sum_j \gamma_j \leq 1, \quad \omega_h > 0 \quad \text{for} \quad h = 1,\ldots,H, \quad \text{and} \quad \sum_h \omega_h \leq 1.$

The introduction of public spending by different levels of government creates a link between differential effects of various expenditures by three levels of government and growth. The division of consolidated or total government spending *g* among different levels of government takes the following form:

$$\sum_{i=1}^{I} f_i = \theta_f g \tag{4}$$

$$\sum_{j=1}^{J} s_j = \theta_S g \tag{5}$$

$$\sum_{h=1}^{H} l_h = \theta_h g \tag{6}$$

and $\theta_f + \theta_s + \theta_l = 1$ and $0 < \theta_i < 1$ for *i* = *f*, *s*, and *l*. Thus, θ_f is the share of federal government in total spending, θ_S is the share of state governments, and θ_l the share of local governments. It is further assumed that the federal government spends a share of $\delta_i (i = 1,\ldots,I)$ on its i-th item f_i, state governments spend a share of $\delta_j (j = 1,\ldots,J)$ on their j-th item s_j, and local governments spend a share of $\delta_h (h = 1,\ldots,H)$ on their h-th item s_h.

Therefore,

$$f_i = \delta_i \theta_f g \quad \text{for} \quad i = 1,\ldots,I \quad \text{and} \quad \sum \delta_i = 1$$

$$s_j = \delta_j \theta_S g \quad \text{for} \quad j = 1,\ldots,J \quad \text{and} \quad \sum \delta_S = 1 \qquad (7)$$

$$l_h = \delta_h \theta_l g \quad \text{for} \quad h = 1,\ldots,H \text{ and } \sum \delta_h = 1$$

The consolidated government spending g is financed by a flat income tax at rate τ:

$$g = \tau y \qquad (8)$$

The representative agent's preference is given by

$$U = \int_o^\infty u(c, f, s, l) e^{-pt} dt \qquad (9)$$

where c is per capita private consumption, ρ is the positive time discount rate, and $u(c, f, s, l)$ is an increasing, concave and differentiable utility function.

The dynamic budget constraint of the representative agent is:

$$\frac{dk}{dt} = (1-\tau)y - c = (1-\tau)k^{\alpha}[\prod_{i=1}^{I} f_i^{\beta_i}]^{\beta}[\prod_{j=1}^{J} s_j^{\gamma_j}]^{\gamma}[\prod_{h=1}^{H} l_h^{\omega_h}]^{\omega} - c \qquad (10)$$

For analytical simplicity, let

$$u(c, f, s, l) = 1n\, c + \sigma_f \ln \prod_{i=1}^{I} f_i^{\beta_i} + \sigma_s \ln \prod_{j=1}^{J} s_j^{\gamma_j} + \sigma_l \ln \prod_{h=1}^{H} l_h^{\omega_h} \qquad (11)$$

where σ_f, σ_S, and σ_l are positive. While the productivity of the expenditures by the federal, state and local governments are measured by β, γ, and ω, respectively, their impacts on the representative agent's utility are measured by σ_f, σ_s and σ_l, respectively. All government expenditures enter the production function and the utility function in the Cobb-Douglas form. That is to say, production and consumption services from public

expenditures are generated through a specific production technology. Again, the Cobb-Douglas form is adapted here for analytical tractability.

We further assume a constant tax rate τ along the balanced growth path. Hence the ratio ($\frac{g}{y}$) is constant. With simple, but tedious calculation,

$$\frac{y}{k} = \frac{g}{\tau k} = \tau \frac{1-\alpha}{\alpha} [\prod_{i=1}^{I} \delta_i^{\beta_i}]^{\frac{\beta}{\alpha}} [\prod_{j=1}^{J} \delta_j^{\gamma_j}]^{\frac{\gamma}{\alpha}} [\prod_{h=1}^{H} \delta_h^{\omega_h}]^{\frac{\omega}{\alpha}} \theta_f^{\frac{\beta}{\alpha}\sum_{i=1}^{I}\beta_i} \theta_s^{\frac{\gamma}{\alpha}\sum_{j=1}^{J}\gamma_j} \theta_l^{\frac{\omega}{\alpha}\sum_{h=1}^{H}\omega_h} \quad (12)$$

Given the total government spending g, the constant tax rate τ, and the shares of spending by different levels of government $(\theta_i's, i = f, s, l)$ among the aggregate government spending, and the shares of allocations of public expenditures among various sectors by each level of government $(\delta_i, i = 1,\ldots,I, \delta_j, j = 1,\ldots,J$ and $\delta_h, h = 1,\ldots,H)$, representative agent's choices are determined by maximizing (9) with respect to *c* and *k* subject to (10) and initial conditions. Along the balanced growth, the solution for the per capita growth rate of the economy is given by:

$$\frac{dy/dt}{y} = \alpha(1-\tau)\frac{y}{k} - \rho$$

or

$$\frac{dy/dt}{y} = \alpha(1-\tau)\tau^{\frac{1-\alpha}{\alpha}} [\prod_{i=1}^{I} \delta_i^{\beta_i}]^{\frac{\beta}{\alpha}} [\prod_{j=1}^{J} \delta_j^{\gamma_j}]^{\frac{\gamma}{\alpha}} [\prod_{h=1}^{H} \delta_h^{\omega_h}]^{\frac{\omega}{\alpha}} \theta^{f^{\frac{\beta}{\alpha}\sum_{i=1}^{I}\beta_i}} \theta_s^{\frac{\gamma}{\alpha}\sum_{j=1}^{J}\gamma_j} \theta_l^{\frac{\omega}{\alpha}\sum_{h=1}^{H}\omega_h} - \rho \quad (13)$$

For the case that , $\sum \beta_i = 1, \sum \gamma_j = 1$ and $\sum \omega_h = 1,$ the expression can be further

simplified to be:

$$\frac{dy/dt}{y} = \alpha(1-\tau)\tau^{\frac{1-a}{\alpha}}[\prod_{i=1}^{I}\delta_i^{\beta_i}]^{\frac{\beta}{\alpha}}[\prod_{j=1}^{J}\delta_j^{\gamma_j}]^{\frac{\gamma}{\alpha}}[\prod_{h=1}^{H}\delta_h^{\omega_h}]^{\frac{\omega}{\alpha}}\theta_f^{\frac{\beta}{\alpha}}\theta_s^{\frac{\gamma}{\alpha}}\theta_l^{\frac{\omega}{\alpha}} - \rho \qquad (14)$$

Both equation (13) and (14) show that the long-run growth rate of per capita output is a function of the tax rate, shares of spending by different levels of government, and the shares of spending allocation on various public expenditures undertaken by the three levels of government, respectively. This understanding is the theoretical foundation for our empirical investigation on the relationship between growth and intersectoral and intergovernmental allocations of public expenditures. Please note that, for a given share of total government spending in GDP, a reallocation of public spending among different levels of government and among different sectors can lead to higher economic growth if the existing allocation is different from the growth-maximizing allocation of public expenditures. To show this point, we maximize the growth rate in the simple case of equation (14):

$$\text{Max } \{\alpha(1-\tau)\tau^{\frac{1-\alpha}{\alpha}}[\prod_{i=1}^{I}\delta_i^{\beta_i}]^{\frac{\beta}{\alpha}}[\prod_{j=1}^{J}\delta_j^{\gamma_j}]^{\frac{\gamma}{\alpha}}[\prod_{h=1}^{H}\delta_h^{\omega_h}]^{\frac{\omega}{\alpha}}\theta_f^{\frac{\beta}{\alpha}}\theta_s^{\frac{\gamma}{\alpha}}\theta_l^{\frac{\omega}{\alpha}} - \rho\} \qquad (15)$$

by choosing $\delta_i (1 = 1,\ldots,)$, $\delta_j (j = 1,\ldots, J)$, $\delta_h (h = 1,\ldots, H)$, θ_f, θ_S, and θ_l subject to the constraint $\theta_f + \theta_s + \theta_l = 1$, $\sum \delta_i = 1$, $\sum \delta_j = 1$ and $\sum \delta_h = 1$. The solution to this problem involves the following formulae for the growth-maximizing case:

$$\theta_f^* = \frac{\beta}{\beta + \gamma + \omega} \tag{16}$$

$$\theta_s^* = \frac{\gamma}{\beta + \gamma + \omega} \tag{17}$$

$$\theta_l^* = \frac{\omega}{\beta + \gamma + \omega} \tag{18}$$

$$\delta_i^* = \frac{\beta i}{\sum \beta_i} = \beta_i \quad \text{for} \quad i = 1, \ldots, I \tag{19}$$

$$\delta_j^* = \frac{\gamma_j}{\sum \gamma_j} = \gamma_j \text{ for} \quad j = 1, \ldots, J \tag{20}$$

$$\delta_h^* = \frac{\omega_h}{\sum \omega_h} = \omega_h \quad \text{for} \quad h = 1, \ldots, H \tag{21}$$

Therefore, as long as the actual $\theta_f, \theta_s, \theta_l, \delta_i (i = 1, \ldots, I)$, $\delta_j \left(j = 1, \ldots, J \right)$ and $\delta_h (h = 1, \ldots, H)$ differ from the growth-maximizing ones $\theta_f^*, \theta_s^*, \theta_l^*, \delta_i^* (i = 1, \ldots, I)$, $\delta_j^* (j = 1, \ldots, J)$ and $\delta_h^* (h = 1, \ldots, H)$ as in (16) to (21), the growth rate can always be increased without any change in the tax rate and the total budget size in the GDP.

We also have simple explanations for the growth-maximizing shares for different levels of government spending $\theta_f^*, \theta_s^*, \theta_l^*$, and the multisector allocation of public spending by the three levels of government $\delta_i^* (i = 1, \ldots, I)$, $\delta_j^* (j = 1., \ldots, J)$ and $\delta_h^* (h = 1, \ldots, H)$ as in (16) to (21). We can regard β, γ, and ω as the measures for the total productivity of federal, state, and local government spending, respectively, and

$(\beta + \gamma + \omega)$ as the aggregate productivity of all government spending. The growth-maximizing shares for public spending allocation among three levels of government are just the ratios of individual productivity over the total productivity. Similarly, we can take the vectors $\{\beta_i\}_{i=1}^{I}$, $\{\gamma_j\}_{j=1}^{J}$ and $\{\omega_h\}_{h=1}^{H}$ to be the vectors of sectoral productivity (in generating productive services) for the multisector expenditures by the federal, state, and local governments, respectively. For each level of government, these productivity measures sum to unity. The growth-maximizing rule for each sector allocation at each level of government is again the ratio of its productivity over the total productivity, which is one. Of course, these explanations depend on our specific assumptions on the production technology. For a general production technology, it is difficult to have the nice separability in the rules for allocating public spending among different levels of government from the rules for spending among multiple sectors by each level of government.

Regarding fiscal decentralization and the allocation of budget among different levels of government, an important point can be derived from this theoretical exercise: it does not hold true that the more decentralized a country's fiscal system becomes, the faster its economy grows. As far as economic growth is concerned, there exists only an optimal degree of fiscal decentralization, which is determined by the relative productivity of different levels of government spending in our specific example.

In our specific example, it is very easy to show that the growth-maximizing allocation rules for public expenditures are the same as the welfare-maximizing rules for public spending as a result of logarithmic utility function. This is an extension of the result obtained by Davoodi, Xie, and Zou (1995).

From our theoretical analysis in equation (14), the growth rate is determined directly by the tax rate, the allocation of public spending among different levels of governments, the allocation of spending among different sectors by each level of government, and other exogenous variables. For a linear approximation, we have the following regression equation:

$$\frac{dy/dt}{y} = \mu_o + \mu_\tau \tau + \mu_s \theta_s + \mu_l \theta_l + \sum_{i=1}^{I-1} \mu_i \delta_i + \sum_{j=1}^{J-1} \mu_j \delta_j + \sum_{h=1}^{H-1} \mu_h \delta_h + \mu_z Z \qquad (22)$$

where Z is a vector of other exogenous variables in growth literature that we will control in our estimations and $\mu' s$ are the coefficients to be estimated. It shall be noted that we have dropped $\theta_f, \delta_I, \delta_J, \delta_H$ in equation (22) because of the various add-up conditions for these share variables.

3 Fiscal decentralization, public spending, and growth in India: 1970-94

The constitution of the Republic of India can be described as quasi-federal in character because it provides for a federal structure with a strong unitary feature. The states have a substantial degree of autonomy within the area of responsibility granted to them by the constitution. At the same time, local government affairs are entirely within the states' sphere, and local governments do not have constitutional status (see Chelliah, 1990; Agarwala, 1992, Rao and Sen, 1996, Rao, 1997, and Singh, 1997, for details).

For expenditure assignments between the center and states, the constitution provides three lists: the Union list, the States list, and the concurrent list. All matters relating to defense, currency, banking, foreign affairs, and interstate relations are in the exclusive domain of the central government. The states are responsible for maintenance of law and

order and the courts, the social sector, agriculture, infrastructure, trade within the state, and overall development of the state economy. The concurrent list of responsibility includes important civil matter such as law, marriage, succession, administration of justice, trusts and civil procedure, economic and social planning, social security, education, trade unions, and electricity. By international comparison, especially among developing countries, India is quite decentralized by the conventional measure of fiscal decentralization: the share of subnational (state) government spending out of the total (state and central) government spending. Table 1 shows the ratio of total state spending over total government spending according to IMF's Government Finance Statistics (GFS). From 1974 to 1993 this ratio was between 60 - 64% and remained stable.

On the revenue side, the constitutional assignment of tax powers has been based on two principles. The first is the avoidance of assigning any one tax to the center and the states at the same time. The second is that the most important taxes, which have economywide implications or which can be collected most efficiently and economically by the central government, should be assigned to the center. In the end, the center has the power to levy individual and corporate income tax , all excise taxes, and custom duties. Therefore, the central government has the most productive sources of revenue with wide bases. According to IMF's Government Finance Statistics (GFS), the share of state revenue collection out of total government tax revenue ranged from 31-36% from 1974 to 1993. Therefore, the revenue measure of fiscal decentralization is relatively low compared to the corresponding spending measure (see Table 1).

The composition of central government expenditures is illustrated in Tables 2a and 2b. Table 2a is calculated according to the IMF's GFS classification. Defense spending relative to other services was the highest, about 15-26% of the total budget. Spending on

health, education, and transportation were relatively low, ranging from 1 to 3%. Spending was moderate on general public services (6-9%), agriculture (5-10%), housing (3-7%), mining (2-8%), and other economic services (5-9%). Spending on mining decreased steadily from 9 to 2% from 1977 to 1993, while spending on housing rose substantially from 3 to 7% during the same period. At the same time, its spending share on general public services remained stable.

Table 2b provides another perspective on central spending on the basis of India Economic Statistics (various years). It divides spending into three major categories: development spending, nondevelopment spending, and social and community services. From 1970 to 1990, on average, the central government spent 31% of its budget on development, 47.5% on non-development services, and 6.4% on social and community services.

Table 3 provides data on state spending by function according to IMF's GFS. Across the states, major budget allocation went to education (22-25%), agriculture (14 -25%), and general public services (14-18%). Spending for health, housing, social security, energy, and transportation was moderate. ranging between 4-7% of total state spending. We also note that total state spending on various functions was highly stable in terms of the allocation ratios.

In order to have a better understanding of public spending at the individual state level, we have collected spending data for 16 major Indian states in four categories: administration, economic services, education, and health; see Tables 4-7. These tables show large variations in public spending across states and over time. For example, on the average, *Kerala* spent about 7% of its total budget on administration (Table 4), while *Bihar* and *Punjab* spent about 11% on administration. In the state of Assam, the spending share on

administration varied from a minimum of 1.4% to a maximum of 14.5% in *Assam* between 1970 and 1994. Many other states also experienced large changes in spending for administration.

Spending for economic services was the largest single item of state spending across Indian states. On average, their spending share ranged from 27% in *West Bengal* to 46% in *Haryana*; see Table 5. Over time, the spending share for economic services was also much more stable than the share for administration.

Education spending varied across states and over time. For example, spending share for education varied from 2 to 22.7% in *Himachal Pradesh*. But on average, it accounted for 16 to 28% of state budget from 1970-1994; see Table 6.

As with administration, state spending shares on health (Table 7) varied significantly from highs of 6.7% in *Haryana* to 13% in *Himachal Pradesh* to lows of 0.2% in *Madhya Pradesh*, 0.4% in *Maharashtra*, 0.5% in *Orissa*, and 0.6% in *Punjab*.

Table 8 presents a brief look at the growth picture across the 16 major Indian states from 1970 to 1994. All states experienced large variations in their per capita income growth rates with episodes of significant, negative growth in per capita income. During the 24 years in our sample, *Gujarat*, *Tamil Nadu*, and *Maharashtra* performed relatively well, with an average growth rate greater than 3%. At the same period, *Rajasthan*, *West Bengal*, and *Bihar* performed poorly, with an average annual growth rate of around 1%.

With a panel data on the 16 states, we can look at fiscal decentralization from the state perspective rather than the national aggregate ratios, such as total state spending to total central spending and total state revenue collection to total central collection, which were discussed earlier using the IMF's data (Table 1). Two alternative measures immediately

come forward as plausible indicators: (1) the ratio of state spending in each state to total central spending, and (2) the ratio of state own revenue collection in each state to total central revenue collection. Rises in these two ratios across the 16 states implies fiscal decentralization because more spending and revenue collection are undertaken by the sixteen states instead of the center. However, if these ratios increase in some states and decrease in other states, the aggregate picture is obscured because the ratio of total state spending (own revenue) to the central spending (revenue) may stay the same. In this case, we cannot say too much about how economic growth relates to fiscal decentralization. But from the state perspective, the rise and fall in these two ratios and their effects on state spending and economic growth can be clearly identified.

Since Indian states have different sizes in terms of population size, area, and GDP, we can make the ratios more comparable across states using two adjusted measures: (1) the ratio of per capita state spending in each state to per capita central spending, and (2) the ratio of per capita state revenue collection in each state to per capita central revenue collection. Table 9 illustrates the ratio of per capita state spending in each of the 16 states to per capital central spending from 1970 to 1994. *Himachal Pradesh, Andhra Pradesh,* and *Punjab* had a higher degree of fiscal decentralization than the other states in terms of per capita state spending relative to per capita central spending. It is clear from Table 9 that there are less variations in fiscal decentralization over time than the variations across the 16 states.

4 Empirical estimations with state-level data

4.1 Variables and estimation equations

Our review of public expenditures by sectors and by levels of government in India shows large variation and diversity across states and over time. The same can be said of the growth rate across states. To examine how intergovernmental fiscal arrangements and allocation of public spending in different sectors by the central and state governments have affected regional (state) economic growth, we utilize the panel data over from 1970 to 1994 for 16 major Indian states. The dependent variable is real per capita income growth rate in each state. We take a five-year forward-moving average of per capita real income growth in our regression analysis in order to eliminate short-term fluctuations, increase the number of time series observations in our panel data, and reflect the delayed impact of public expenditures on economic growth (for methodological details on the lagged structure of growth rates see Devarajan, Swaroop, and Zou, 1996). The regression equation is defined as follows:

$$Y^i_{(t+1,t+5)} = \beta_0 FDC^i_t + \beta_1 CDEV_t + \beta_2 CNONDEV_t + \beta_3 CSOCCOM_t + \beta_4 SADM^i_t + \beta_5 SEDU^i_t + \beta_6 SHLTH^i_t + \beta_7 SECON^i_t + \Theta Z^i_t$$

where the variables are:

$Y^i_{(t+1,t+5)}$: Five-year forward-moving average of per capita real income growth in state i.

FDC^i_t : Measures of fiscal decentralization across states at time t. Four alternatives will be utilized in this paper:

(1) $FDCEXP^i_t$ = (total state public spending in state i)/(total central spending),

(2) $FDCEXPPC^i_t$ = (per capita state spending in state i)/(per capital central spending),

(3) $FDCTAX^i_t$ = (total state own revenue in state i)/(total central revenue),

(4) $FDCTAXPC^i_t$ = (per capita state revenue in state i)/(per capital central revenue).

$CDEV_t$: Ratio of central development spending to total central spending at time t.

$CNONDEV_t$: Ratio of central nondevelopment spending to total central spending at time t.

$CSOCCOM_t$: Ratio of central social and community service spending to total central spending at time t.

$SADM_t^i$: Ratio of state administration spending to total state spending in state i at time t.

$SEDU_t^i$: Ratio of state education spending to total state spending in state i at time t.

$SHLTH_t^i$: Ratio of state health spending to total state spending in state i at time t.

$SECON_t^i$: Ratio of state economic development spending to total state spending in state i at time t.

Z_t^i : A vector of other control variables in standard growth regression analysis such as the area of each state (*AREA)*, initial (year 1970) per capita real income in each state (*GDP70)*, secondary school enrollment (*SCHOOLING*) in each state, the ratio of state own tax revenue to state aggregate income (*SOTAX)* in each state, and the central tax rate (*CTAX)* defined as the ratio of total central tax revenue over national GDP in India. See Levine and Renelt (1992), and Deverajan, Swaroop and Zou (1996) for the counterparts in cross-country regression analysis.

From our theoretical analysis, the growth rate is determined directly by the tax rate, the allocation of public spending among different levels of government, the allocation of spending among different sectors by each level of government, and other exogenous

variables. Regression (23) can be regarded as a linear approximation of our nonlinear result in equation (13) or (14).

4.2 Regression results

We divide our regression analysis into four parts depending on the choice of the four measures of fiscal decentralization listed in the subsection above. The results are presented in Tables 10-13. These four tables generate very consistent results for most variables, so we summarize the main results next.

First, except for the one measure of fiscal decentralization, *FDCEXP*, the other three measures have positive and even significant estimated coefficients. Therefore, fiscal decentralization, especially decentralization in tax revenue collection, is in general positively associated with Indian regional economic growth on the basis our preliminary statistical analysis. It is interesting to note that when the explanatory variable is the ratio of state spending to central spending in each state, *FDCEXP*, the estimated coefficients under different specifications of the regression equations have very insignificant, negative signs (Table 10). When the ratio is adjusted by population size, *FDCEXPPC*, the estimated coefficients are all positive and with much higher t-statistics ranging from 0.4 to 1.24, weak evidence for the positive impact of fiscal decentralization on state economic growth in India (Table 12). When the measure of fiscal decentralization is the ratio of state own revenue collection to central revenue collection, *FDCTAX*, four estimated coefficients out the five in Table 11 are positive with t-statistics between 1.08 to 1.56. When the decentralization measure is the ratio of per capita state tax revenues to per capita central tax revenue, *FDTAXPC*, (Table 13), these positive estimates are statistically even more significant with the t-statistics between 1.3 to 2.7.

Second, all shares of central government spending on development (*CDEV)* nondevelopment (*CNONDEV)*, and social and community services (*CSOCCOM)* are positively and statistically significantly associated with state economic growth (Tables 10-13). Thus, increases in the central allocation of its budget among these three functions by cutting the cetner's spending on all other functions can promote regional growth.

Third, all shares of state spending on administration (*SADM)*, education (*SEDU),* health (*SHLTH),* and economic development (*SECON)* have rather mixed signs with no statistical significance (Tables 10-13). These results suggest that state public spending shares are broadly consistent with growth-maximizing allocation of public spending.

Fourth, the central tax (*CTAX)* is negatively associated with state economic growth, suggesting that the central tax rate is on the wrong side of the "Laffer curve" in the sense of the Barro (1990) model. At the same time, the state tax has a positive, significant effect on economic growth and is on the left side of the "Laffer curve". These results indicate the possibility that central tax collection is too high relative to state collection, and a further decentralization in revenue collection promotes regional economic growth. Since both the central tax and state tax revenues finance productive public spending, the effect of a moderately distortionary tax may be outweighed by the substantial productive effect of tax revenues. Our preliminary results support this theoretical prediction for the state tax, not for the central tax.

Fifth, for all other control variables, we find that human capital formation represented by the variable *(Schooling)* is positively associated with state economic growth, whereas area (*AREA)* and initial income *(GDP70)* have no significant effect on state economic growth.

5. Conclusion

In this paper, we have presented an analytical model for examining the growth impact of intergovernmental and intersectoral allocation of public expenditure. The model helps us quantify the role of fiscal decentralization in regional economic growth and identify whether central and local allocation of public spending among various sectors is growth-enhancing.

Applying our analytical framework to a panel data set of 16 major states in India, we have found that, in many cases of our regressions, fiscal decentralization is positively, and even statistically significantly, associated with state economic growth. The state allocation of public spending in various sectors is broadly consistent with "growth-maximizing", whereas increases in the central allocation of its budget among development projects, nondevelopment projects, and social and community services by cutting the center's spending on all other functions can promote regional growth. Furthermore, the distortionary effect of the state tax in India is dominated by the productive effect of tax-financed public spending, whereas the reverse holds for the central tax.

Our empirical findings here provide some support for the decentralization theorem in the sense of Oates (1972, 1993). Recently Oates (1993) states:

> The basic *economic* case for fiscal decentralization is the enhancement of economic efficiency..... There surely are strong reasons, in principle, to believe that policies formulated for the provision of infrastructure and even human capital that are sensitive to regional or local conditions are likely to be more effective in encouraging

economic development that centrally determined policies that ignore these geographical differences.

The positive, and sometimes even significant effect of the three measures of fiscal decentralization on regional economic growth found here for India is a remarkable empirical result in light of many cases of a negative impact of fiscal decentralization on economic growth for China (Zhang and Zou, 1996), the United States (Davoodi, Xie, and Zou, 1995), a full sample of developing countries (Davoodi and Zou, 1996), and a full sample of both developing and developed countries (Davoodi and Zou, 1996). Still further empirical work and especially more country case studies are badly needed in order to understand how fiscal decentralization affects economic efficeincy in the real world.

References

Agarwala, Ramgopal (1992) ``China: Reforming Intergovernmental Fiscal Relations." World Bank Discussion Paper Series No. 178, Washington, D.C.

Aschauer, David, (1989) "Is Government Spending Productive?" *Journal of Monetary Economics* 23: 177-200.

Bahl, Roy and Christine Wallich (1992) ``Intergovernmental Fiscal Relations in China." Policy Research Working Paper Series No. 863, the World Bank, Washington, D.C.

Bahl, Roy, W. and Johannes F. Linn (1992) Urban Public Finance in Developing Countries. New York: Oxford University Press.

Barro, Robert (1990) ``Government Spending in a Simple Model of Endogenous Growth." *Journal of Political Economy*, 98, S103-S125.

Barro, Robert and Jong-Wha Lee (1993) ``Losers and Winners in Economic Growth." NBER Working Paper Series No.4341.

Bird, Richard M., and Christine Wallich (1993) ``Fiscal Decentralization and Intergovernmental Relations in Transition Economies: Towards a Systematic Framework of Analysis." Country Economics Department Working Paper, the World Bank, Washington D.C.

Chelliah, R. J. (1990) "Intergovernmental Fiscal Relations and Macroeconomic Management in India." Mimeo, World Bank.

Davoodi, Hamid, Danyang Xie and Heng-fu Zou (1995) ``Fiscal Decentralization and Economic Growth in the United States." Mimeo, Policy Research Department, the World Bank.

Davoodi, Hamid, and Heng-fu Zou (1996) ``Fiscal Decentralization and Economic Growth: A Cross-Country Study." Forthcoming in *Journal of Urban Economics*.

Devarajan, Shantayanan, Vinaya Swaroop and Heng-fu Zou (1996)``The Composition of Public Expenditure and Economic Growth." *Journal of Monetary Economics* 37:313-344.

Dillinger, William (1994) ``Decentralization and Its Implications for Urban Service Delivery", Urban Management and Municipal Finance Discussion Paper No. 16, the World Bank, Washington D.C.

Islam, N. (1995) ``Growth Empirics: A Panel Data Approach." *Quarterly Journal of Economics,* 110.

Levine, Ross and Renelt, David (1992) ``A Sensitivity Analysis of Cross-Country Growth Regressions." *American Economic Review*, 82, no. 4, pp. 942-963.

Oates, Wallace (1972), Fiscal Federalism. New York: Harcourt Brace Jovanovich.

Oates, Wallace E. (1993) ``Fiscal Decentralization and Economic Development." *National Tax Journal*, Vol XLVI No. 2, 237-243

Prud'homme, Remy (1995)``On the Dangers of Decentralization." *World Bank Research Observer* 10: 201-220.

Rao, Govinda (1997), "Intergovernmental Fiscal Relations in a Planned Economy: The Indian Case", mimeo, Australian National University.

Rao, Govinda, and T. K. Sen (1996), *Fiscal Federalism in India: Theory and Practice*. Macmillan India Limited.

Singh, Nirvikar, (1997), Issues in Local Government Reform in India," mimeo, University of California, Santa Cruz.

Tiebout, Charles (1956) ``A Pure Theory of Local Expenditures." *Journal of Political Economy*, 64, 416-424.

Zhang, Tao, and Heng-fu Zou (1996) ``Fiscal Decentralization, Public Spending and Economic Growth in China." Forthcoming in *Journal of Public Economics*.

Zou, Heng-fu (1996) ``Taxes, Federal Grants, Local Public Spending and Growth." *Journal of Urban Economics*, 39: 303-317.

Table 1: Aggregate Picture of Fiscal Decentralization (1974--1993)

	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93
State Rev. / St&C Rev.	32%	33%	33%	32%	33%	33%	33%	34%	34%	33%	33%	32%	32%	32%	32%	31%	33%	33%	32%	36%
State Exp. / St.&C Exp.	63%	62%	62%	64%	64%	63%	64%	64%	64%	64%	63%	63%	62%	62%	62%	63%	62%	63%	64%	60%

Data Source: IMF's GFS

Table 2-a: Central Expenditure by Function as Share of Total Central Expenditure(1974-1993)

	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93
Gen. Pub. Serv.	8%	9%	8%	7%	7%	6%	6%	6%	6%	6%	6%	6%	7%	6%	6%	6%	6%	7%	7%	7%
Defense	26%	25%	23%	22%	20%	20%	20%	21%	21%	20%	19%	18%	20%	20%	19%	17%	17%	15%	15%	16%
Education	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	3%	3%	2%	2%	2%	2%	2%
Health	1%	2%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	1%	2%	2%	2%	2%
Housing	3%	3%	3%	3%	4%	4%	4%	4%	4%	5%	5%	5%	6%	6%	6%	7%	6%	6%	6%	7%
Agric.	7%	5%	4%	6%	7%	9%	7%	6%	6%	8%	10%	8%	8%	7%	8%	7%	8%	8%	8%	6%
Mining	6%	7%	8%	9%	7%	7%	6%	7%	7%	6%	7%	6%	6%	5%	5%	6%	6%	4%	3%	2%
Transportation				2%	3%	3%	3%	3%	3%	2%	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%
Oth. Econ.	5%	5%	6%	7%	9%	7%	8%	8%	8%	7%	7%			6%	6%	6%	5%	7%	6%	9%
Oth Exp.	39%	38%	40%	39%	39%	41%	42%	42%	41%	41%	40%	43%	41%	42%	43%	44%	45%	48%	50%	49%

Data Source: IMF's GFS

Table 2-b: Central Expenditure by Sector as Share of Total Central Exp.: (1970-1994)

Sector	Minimum	Maximum	Average	STDEV
Development	25.24%	35.66%	31.15%	0.0261
Non-Development	42.10%	57.93%	47.50%	0.0445
Social & Community Services	5.30%	7.37%	6.40%	0.0048

Data Source: See Data Appendix

Table 3: State Expenditure by Function as Share of Total State Expenditure(1974-1993)

	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93
Gen. Pub. Serv.	18%	17%	17%	16%	15%	16%	16%	16%	16%	15%	16%	14%	15%	15%	15%	16%	16%	16%	17%	17%
Education	25%	25%	24%	25%	24%	23%	22%	23%	23%	23%	23%	24%	23%	23%	23%	25%	25%	23%	23%	23%
Health	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	5%	5%	5%
Social Security	4%	4%	4%	4%	3%	3%	4%	4%	5%	6%	6%	5%	6%	6%	5%	6%	6%	6%	5%	5%
Housing	4%	4%	5%	4%	5%	4%	5%	6%	5%	6%	8%	9%	8%	8%	8%	6%	7%	7%	7%	7%
Rec. Cult. Rel.	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Agri	20%	21%	22%	24%	25%	24%	23%	22%	22%	20%	21%	19%	19%	18%	18%	16%	15%	15%	15%	14%
Mining	1%	1%	1%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Fuel & Energy	3%	4%	3%	4%	4%	4%	5%	5%	5%	5%	5%	5%	5%	6%	5%	5%	4%	9%	6%	6%
Transport.	7%	7%	7%	7%	8%	8%	7%	7%	6%	6%	6%	6%	5%	5%	5%	5%	5%	5%	6%	6%
Other Econ.	2%	2%	1%	1%	2%	3%	3%	3%	2%	2%	1%	2%	1%	1%	2%	2%	2%	1%	2%	2%
Other Exp.	7%	8%	7%	7%	6%	6%	6%	6%	7%	7%	7%	8%	9%	9%	9%	10%	11%	11%	12%	12%

Data Source: IMF's GFS

Table 4: State Spending on Administration (as share of total state spending): 1970-1994

State	Minimum	Maximum	Average	STDEV
Andhra Pradesh	7.53%	10.27%	8.69%	0.0088
Assam	1.41%	14.55%	10.65%	0.0352
Bihar	9.44%	15.37%	10.95%	0.0141
Gujarat	6.25%	24.62%	9.15%	0.0396
Haryana	6.50%	10.81%	8.08%	0.0090
Himachal Pradesh	8.09%	16.03%	9.82%	0.0189
Karnataka	6.02%	8.30%	6.88%	0.0053
Kerala	5.67%	9.32%	7.16%	0.0088
Madhya Pradesh	7.61%	13.65%	9.00%	0.0170
Maharashtra	8.08%	13.16%	10.03%	0.0139
Orissa	1.89%	12.76%	7.96%	0.0246
Punjab	8.69%	14.19%	10.97%	0.0165
Rajasthan	6.10%	11.15%	8.00%	0.0134
Tamil Nadu	6.21%	33.24%	10.55%	0.0563
Uttar Pradesh	3.34%	12.10%	9.33%	0.0187
West Bengal	1.58%	15.35%	10.00%	0.0255

Data Source: See Data Appendix

Table 5: State Spending on Economic Services(as share of total state spending): 1970-1994

State	Minimum	Maximum	Average	STDEV
Andhra Pradesh	30.01%	50.87%	40.29%	0.04833
Assam	24.22%	66.40%	35.60%	0.09261
Bihar	26.68%	42.35%	37.91%	0.03945
Gujarat	22.11%	51.28%	40.90%	0.22433
Haryana	35.97%	59.56%	46.30%	0.06973
Himachal Pradesh	31.19%	45.14%	39.93%	0.03845
Karnataka	32.13%	48.81%	42.04%	0.04381
Kerala	23.22%	40.27%	29.75%	0.04141
Madhya Pradesh	24.20%	50.24%	39.62%	0.07117
Maharashtra	20.97%	54.67%	40.06%	0.07671
Orissa	28.49%	48.40%	38.67%	0.05807
Punjab	24.32%	55.45%	35.88%	0.06975
Rajasthan	18.58%	48.78%	35.78%	0.07203
Tamil Nadu	25.73%	48.33%	34.45%	0.20565
Uttar Pradesh	25.86%	48.05%	38.81%	0.12547
West Bengal	19.73%	33.19%	26.85%	0.03266

Data Source: See Data Appendix

Table 6: State Spending on Education(as share of total state spending): 1970-1994

State	Minimum	Maximum	Average	STDEV
Andhra Pradesh	9.88%	22.92%	17.80%	0.02498
Assam	11.28%	32.26%	22.57%	0.03994
Bihar	16.02%	26.59%	21.04%	0.02721
Gujarat	15.55%	56.33%	21.02%	0.08508
Haryana	13.64%	21.64%	15.93%	0.04160
Himachal Pradesh	2.24%	22.67%	18.19%	0.04142
Karnataka	17.62%	21.93%	19.19%	0.01336
Kerala	8.72%	34.40%	28.05%	0.06014
Madhya Pradesh	13.76%	25.02%	17.66%	0.03383
Maharashtra	11.17%	22.37%	18.28%	0.02687
Orissa	13.64%	21.94%	17.52%	0.02159
Punjab	13.79%	25.99%	20.81%	0.03072
Rajasthan	15.95%	23.05%	19.18%	0.02184
Tamil Nadu	17.20%	92.82%	25.01%	0.16107
Uttar Pradesh	0.65%	26.21%	19.09%	0.05125
West Bengal	19.63%	26.38%	23.00%	0.01747

Data Source: See Data Appendix

Table 7: State Spending on Health(as share of total state spending): 1970-1994

State	Minimum	Maximum	Average	STDEV
Andhra Pradesh	5.29%	9.73%	7.58%	0.01401
Assam	0.86%	10.95%	7.09%	0.02022
Bihar	2.00%	9.20%	7.12%	0.01802
Gujarat	1.04%	19.97%	7.78%	0.03709
Haryana	0.65%	11.43%	6.73%	0.02688
Himachal Pradesh	6.49%	68.20%	12.77%	0.13118
Karnataka	0.15%	9.70%	7.18%	0.01983
Kerala	1.65%	13.26%	8.90%	0.03256
Madhya Pradesh	0.19%	12.84%	7.72%	0.03100
Maharashtra	0.38%	10.80%	7.36%	0.02472
Orissa	0.51%	11.00%	6.96%	0.02356
Punjab	0.57%	10.66%	7.61%	0.02236
Rajasthan	5.27%	17.05%	9.70%	0.03751
Tamil Nadu	5.16%	27.96%	10.32%	0.04826
Uttar Pradesh	5.31%	10.97%	7.74%	0.01226
West Bengal	7.28%	14.32%	10.25%	0.02064

Data Source: See Data Appendix

Table 8: Per Capita Real Income Growth Rate by State(1970-1994)

	1971-72	1974-75	1980-81	1984-85	1990-91	1994-95	Average from 71-94	STDEV
Andhra Pradesh	4.3%	-10.7%	3.8%	-6.0%	7.6%	-2.6%	2.5%	0.081
Assam	-0.7%	-1.7%	10.3%	1.1%	2.8%	-8.8%	2.0%	0.081
Bihar	0.1%	-9.4%	7.4%	6.4%	5.6%	-5.7%	1.1%	0.064
Gujarat	-3.0%	-36.0%	-5.4%	-4.6%	1.8%	25.4%	3.0%	0.145
Haryana	6.4%	-21.8%	9.7%	-1.8%	11.4%	7.2%	2.9%	0.095
Himachal Pradesh	2.6%	-16.9%	10.2%	-8.7%	3.2%	9.2%	2.3%	0.070
Karnataka	-2.3%	-18.3%	-3.3%	2.8%	2.7%	4.8%	2.6%	0.079
Kerala	-3.4%	-16.4%	-2.4%	3.4%	4.0%	1.7%	2.1%	0.063
Madhya Pradesh	7.2%	-14.0%	22.8%	-11.3%	13.6%	-3.7%	2.6%	0.102
Maharashtra	0.1%	-3.5%	0.1%	-1.0%	6.1%	9.2%	3.8%	0.064
Orissa	-4.1%	-26.3%	25.2%	-13.2%	-13.4%	-1.1%	2.3%	0.129
Punjab	1.7%	-20.6%	-11.1%	2.5%	0.4%	5.0%	2.6%	0.077
Rajasthan	-12.9%	-25.6%	7.0%	-8.4%	20.3%	-10.2%	0.9%	0.129
Tamil Nadu	8.4%	-24.4%	-8.0%	8.8%	7.2%	11.4%	3.4%	0.092
Uttar Pradesh	-0.8%	-16.2%	20.4%	-0.9%	7.2%	2.2%	1.8%	0.089
West Bengal	5.2%	-12.9%	3.5%	6.9%	4.1%	3.4%	1.1%	0.059

Data Source: See Data Appendix

Table 9: Fiscal Decentralization in terms of per capita total expenditure: State vs. Center

	1980-81*	1984-85*	1987-88	1990-91	1993-94	Average from 71-93	STDEV
Andhra Pradesh	11.28%	11.49%	12.27%	10.91%	13.21%	11.83%	0.008
Assam	7.17%	8.51%	8.41%	18.64%	6.46%	8.40%	0.030
Bihar	5.36%	4.69%	4.76%	4.81%	4.92%	5.02%	0.005
Gujarat	10.14%	9.43%	10.44%	9.24%	10.46%	9.69%	0.022
Haryana	12.13%	10.35%	10.09%	9.79%	9.93%	10.71%	0.012
Himachal Pradesh	17.50%	15.55%	17.54%	14.61%	17.14%	16.69%	0.014
Karnataka	8.30%	8.33%	7.66%	7.96%	9.18%	8.20%	0.007
Kerala	10.46%	8.08%	7.42%	7.84%	8.53%	8.67%	0.014
Madhya Pradesh	9.29%	9.09%	8.61%	8.73%	9.37%	7.48%	0.003
Maharashtra	11.01%	11.04%	9.65%	9.61%	10.47%	9.91%	0.017
Orissa	7.66%	7.42%	7.17%	6.98%	8.16%	7.48%	0.005
Punjab	11.09%	11.26%	9.88%	10.72%	12.71%	10.78%	0.027
Rajasthan	8.58%	6.89%	8.42%	7.08%	8.42%	7.80%	0.009
Tamil Nadu	7.73%	7.91%	7.50%	2.08%	9.48%	8.00%	0.023
Uttar Pradesh	6.12%	5.01%	5.45%	5.85%	5.47%	5.23%	0.014
West Bengal	6.88%	6.64%	6.04%	6.51%	6.11%	6.39%	0.006

Data Source: See Data Appendix

Table 10: Effect of Intersectoral and Intergovernmental Allocation of Public Expenditure

Dependent Variable: Real Per Capita Net State Product Growth Rate

Independent Variables	[1]	[2]	[3]	[4]	[5]
CONSTANT	-0.719	-0.72	-0.731	-0.734	-1.192
	[-3.662]	[-3.648]	[-3.699]	[-3.724]	[-5.869]
FDCEXP	-0.042	-0.083	-0.199	-0.15	-0.519
	[-0.055]	[-0.082]	[-0.195]	[-0.147]	[-0.535]
CDEV	1.162	1.164	1.177	1.163	2.245
	[3.087]	[3.071]	[3.104]	[3.075]	[5.626]
CNONDEV	0.476	0.477	0.478	0.458	0.813
	[3.041]	[3.033]	[3.041]	[2.911]	[5.032]
CSOCCOM	2.583	2.579	2.563	2.586	9.513
	[3.514]	[3.489]	[3.466]	[3.508]	[7.55]
SADM	0.052	0.053	0.043	0.018	0.051
	[0.450]	[0.453]	[0.369]	[0.15]	[0.414]
SEDU	-0.068	-0.067	-0.058	-0.051	-0.093
	[-1.393]	[-1.285]	[-1.075]	[-0.945]	[-1.763]
SHLTH	0.028	0.028	0.027	-0.006	-0.073
	[0.408]	[0.401]	[0.385]	[-0.09]	[-1.094]
SECON	-0.008	-0.008	-0.012	-0.015	-0.004
	[-0.321]	[-0.326]	[-0.476]	[-0.576]	[-0.164]
AREA		0	0	0	0
		[0.061]		[0.593]	
GDP70			[0.435]		[0.147]
			0	0	0
SCHOOLING			[1.012]	[0.95]	[-0.54]
				0.108	0.0133
CTAX				[1.643]	[2.19]
					-6.392
SOTAX					[-6.685]
					0.253
					[2.622]
Number of Observations	272	272	272	272	272
R-Square	0.11	0.112	0.115	0.124	0.259
Adjusted R-Square	0.084	0.081	0.081	0.087	0.222
S.E. of Regression	0.027	0.027	0.027	0.027	0.025
Durbin-Wats	1.403	1.405	1.39	1.375	1.53

Note: t-statistics are in parentheses

Data Source: See Data Appendix

Table 11 Effect of Intersectoral and Intergovernmental Allocation of Public Expenditure

Dependent Variable: Real Per Capita Net State Product Growth Rate

Independent Variables	[1]	[2]	[3]	[4]	[5]
CONSTANT	-0.709	-0.691	-0.699	-0.707	-1.193
	[-3.621]	[-3.507]	[-3.524]	[-3.567]	[-5.872]
FDCTAX	0.087	0.111	0.099	0.085	0.018
	[1.382]	[1.561]	[1.263]	[1.083]	[-0.22]
CDEV	1.132	1.101	1.11	1.108	2.237
	[3.015]	[2.91]	[2.927]	[2.925]	[5.601]
CNONDEV	0.467	0.458	0.46	0.444	0.815
	[2.988]	[2.917]	[2.925]	[2.821]	[5.048]
CSOCCOM	2.594	2.613	2.607	2.621	9.561
	[3.548]	[3.568]	[3.553]	[3.581]	[7.605]
SADM	0.045	0.04	0.036	0.014	0.03
	[0.395]	[0.346]	[0.312]	[0.119]	[0.242]
SEDU	-0.071	-0.085	-0.079	-0.069	-0.097
	[-1.45]	[-1.616]	[-1.451]	[-1.269]	[-1.831]
SHLTH	0.043	0.043	0.042	0.009	-0.065
	[0.632]	[0.64]	[0.614]	[-0.125]	[-0.979]
SECON	-0.012	-0.01	-0.011	-0.014	-0.002
	[-0.471]	[-0.407]	[-0.455]	[-0.554]	[-0.067]
AREA		0	0	0	0
		[-0.727]	[-0.4]	[-0.107]	[0.321]
GDP70			0	0	0
			[0.406]	[0.428]	[-0.558]
SCHOOLING				0.099	0.132
				[1.516]	[2166]
CTAX					-6.379
					[-6.66]
SOTAX					0.229
					[2.166]
Number of Observations	272	272	272	272	272
R-Square	0.118	0.12	0.12	0.128	0.258
Adjusted R-Square	0.091	0.089	0.086	0.091	0.221
S.E. of Regression	0.027	0.027	0.027	0.027	0.025
Durbin-Wats	1.396	1.386	1.385	1.361	1.527

Note: t-statistics are in parentheses

Data Source: See Data Appendix

Table 12: Effect of Intersectoral and Intergovernmental Allocation of Public Expenditure

Dependent Variable: Real Per Capita Net State Product Growth Rate

Independent Variables	[1]	[2]	[3]	[4]	[5]
CONSTANT	-0.724	-0.741	-0.742	-0.739	-1.206
	[-3.697]	[-3.753]	[-3.754]	[-3.742]	[-5.916]
FDCEXPPC	0.068	0.101	0.081	0.038	0.053
	[1.012]	[1.239]	[0.882]	[0.404]	[0.594]
CDEV	1.169	1.197	1.195	1.171	2.265
	[3.11]	[3.166]	[3.157]	[3.096]	[5.649]
CNONDEV	0.462	0.463	0.466	0.453	0.812
	[2.949]	[2.948]	[2.96]	[2.881]	[5.033]
CSOCCOM	2.673	2.699	2.672	2.641	9.647
	[3.624]	[3.652]	[3.601]	[3.56]	[7.627]
SADM	0.048	0.049	0.044	0.019	0.039
	[0.414]	[0.432]	[0.378]	[0.163]	[0.323]
SEDU	-0.058	-0.038	-0.04	-0.043	-0.082
	[-1.146]	[-0.675]	[-0.694]	[-0.758]	[-1.448]
SHLTH	-0.003	-0.014	-0.005	-0.018	-0.087
	[-0.034]	[-0.186]	[-0.067]	[-0.234]	[-1.181]
SECON	-0.013	-0.018	-0.017	-0.017	-0.005
	[0.497]	[-0.67]	[-0.671]	[-0.646]	[-0.224]
AREA		0	0	0	0
		[0.717]	[0.764]	[0.76]	[0.047]
GDP70			0	0	0
			[0.489]	[0.648]	[-0.719]
SCHOOLING				0.099	0.122
				[1.448]	[1.929]
CTAX					-6.41
					[-6.703]
SOTAX					0.236
					[2.527]
Number of Observations	272	272	272	272	272
R-Square	0.115	0.117	0.117	0.124	0.259
Adjusted R-Square	0.088	0.086	0.0836	0.087	0.221
S.E. of Regression	0.027	0.027	0.027	0.027	0.025
Durbin-Wats	1.395	1.407	1.402	1.377	1.531

Note: t-statistics are in parentheses

Data Source: See Data Appendix

Table 13: Effect of Intersectoral and Intergovernmental Allocation of Public Expenditure

Dependent Variable: Real Per Capita Net State Product Growth Rate

Independent Variables	[1]	[2]	[3]	[4]	[5]
CONSTANT	-0.697	-0.707	-0.654	-0.658	-1.19
	[-3.581]	[-3.617]	[-3.323]	[-3.352]	[-5.876]
FDCTAXPC	0.01	0.011	0.026	0.026	0.021
	[2.139]	[2.241]	[2.708]	[2.683]	[1.315]
CDEV	1.11	1.126	1.044	1.033	2.225
	[2.974]	[3.005]	[2.778]	[2.757]	[5.591]
CNONDEV	0.453	0.457	0.428	0.408	0.821
	[2.912]	[2.929]	[2.741]	2.619]	[5.098]
CSOCCOM	2.622	2.612	2.675	2.693	9.414
	[3.604]	[3.585]	[3.683]	[3.719]	[7.484]
SADM	0.066	0.07	0.136	0.111	0.022
	[0.575]	[0.614]	[1.135]	[0.919]	0.148]
SEDU	-0.083	-0.073	-0.11	-0.103	-0.098
	[-1.684]	[-1.429]	[-2.01]	[-1.866]	[-1.877]
SHLTH	0.041	0.045	0.066	0.033	-0.047
	[0.614]	[0.674]	[0.975]	[0.47]	[-0.701]
SECON	-0.02	-0.024	-0.032	-0.035	-0.012
	[-0.795]	[-0.911]	[-1.226]	[-1.318]	[-0.483]
AREA		0	0	0	0
		[0.674]	[0.109]	[0.355]	[-0.106]
GDP70			0	0	0
			[-1.812]	[-1.82]	[-1.407]
SCHOOLING				0.104	0.132
				[1.617]	[2.192]
CTAX					-6.079
					[-6.186]
SOTAX					0.07
					[0.44]
Number of Observations	272	272	272	272	272
R-Square	0.127	0.128	0.139	0.147	0.263
Adjusted R-Square	0.1	0.098	0.106	0.111	0.226
S.E. of Regression	0.027	0.027	0.027	0.026	0.025
Durbin-Wats	1.395	1.404	1.437	1.397	1.553

Note: t-statistics are in parentheses
Data Source: See Data Appendix

Data Appendix

Our empirical analysis is based on the aggregate data from *Government Finance* Statistics, International Monetary Fund, and on the annual data for 16 states during the period of 1972/73 -1992/93. Major data sources include "Public Finance: India's Central and State Government" (1996) and "Profiles of States" (1997) by Economic Intelligence Service, India and various publications by Ministry of Finance of the Government of India. Variables used for estimations are listed below with their data sources. Names of states included in our estimations are also listed.

1. Data for the following variables for all the 16 states, except for Andhra Pradesh, Madhya Pradesh, and Orissa, are taken from various publications by Ministry of Finance of the Government of India:

Y	Real per capita NSP (net state product) growth rate, 5-year moving forward average.
CDEV	Spending share on development at the central level
CNONDEV	Spending share on non-development at the central level
CSOCCOM	Spending share on social and community services at the central level
SADM	Spending share on administration at state level
SECON	Spending share on administration at state level
SEDU	Spending share on administration at state level
SHLTH	Spending share on administration at state level
FDCEXP	Fiscal decentralization in expenditure: state vs center
FDCEXPPC	Fiscal decentralization in expenditure: state vs center, adjusted by population
FDCTAX	Fiscal decentralization in tax revenue collection: state vs center
FDCTAXPC	Fiscal decentralization in tax revenue collection: state vs center, adjusted by population
CTAX	Central tax rate
SOTAX	State tax rate
SCHOOLING	School enrollment rate for primary and middle school

2. Data for the variables mentioned above for Andhra Pradesh, Madhya Pradesh, and Orissa are taken from "Public Finance: India's Central and State Government" (1996) by Economic Intelligence Service, India.

3. Data for the following two variables are taken from "Profiles of States" (1997 issue) by Economic Intelligence Service, India.

GPD70	Initial NSP (as in 1970/71)
AREA	Area of each state

List of states included in the estimations:

Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, and West Bengal.