Government Spending on Public Goods: Evidence on Growth and Poverty

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Using panel data from 14 Indian states between 1990 and 2002, this paper empirically examines how the share of government spending on public goods such as health, education and basic infrastructure affects per capita gross domestic product growth and poverty reduction at the state level. Consistent with similar studies based on national-level data sets, the findings from this study show that the share of public goods expenditures in total government spending has a large, positive and significant impact on per capita GDP growth, and that the share of spending on social public goods such as education and health contributes significantly to poverty reduction. Especially, reallocation of expenditures to raise the share of public goods spending could on average increase per capita GDP growth rate by up to 2.7 percentage points, and reallocation of funds to increase the share of social public goods expenditures could on average reduce poverty headcount index by up to 6.6 percentage points.

For more than 35 years India has run fairly big fiscal deficits, building up a huge domestic public debt and large interest payment obligations. For example, debt-to-gross domestic product (GDP) ratio exceeded 80% in 2004 and interest payment obligations climbed from less than 2% of GDP in 1960 to over 7% in 2004. This exceeded substantially the total public investment in 2004, illustrating the adverse impact of the burden of past deficits. At the same time, there is a clear pattern of assigning greater spending responsibility to the states and away from the federal government. The expenditure share of states grew from less than 40% in 1980-81 to close to 50% in 2005-06. However, overall fiscal balance worsened at the state level until 2004, contributing to India’s fiscal difficulties.1

While there was a secular rise in fiscal deficits, India’s taxes showed a modest increase. At 16% of GDP, India’s tax effort is lower than in Malaysia, Brazil or even Sri Lanka.

1 Introduction

In a bid to tackle the deficit problem the growth of public spending has been restrained. But the composition of spending has worsened. There has been a rapid growth in current spending, mostly due to growing interest cost along with a rise in wage bill and subsidies, which has limited the scope for investment spending.

Generous wage awards, particularly by the Fifth Pay Commission in 1998, resulted in near bankruptcy of many state governments and are a major reason for the worsening of the fiscal position at the state level (World Bank 2005a). Thus, wage bill of the consolidated government surged from 5.4% of GDP in 1997 to 7% of GDP in 2000 (Rajaraman 2004). Similarly, growing pension liabilities could create a major fiscal headache in the future unless actions are taken to reverse the financial burden. For example, the pension cost at the federal level doubled between 1995 and 2000, reaching 1% of GDP in 2000 (Palacios 2004). The pension liabilities have also expanded substantially at the state level, in some cases reaching 2% of the state domestic product making this the third largest spending item after wages and interest expenses.

There is considerable confusion about how much money is actually spent on subsidy by the public sector through the budget or through off-budget outlays. Estimates of financial subsidies have ranged from as high as 5% of GDP to 1.8% (Srivastava and Rao 2004; Government of India 2005). Economic subsidies are estimated at 14%-15% of GDP (Srivastava and Rao 2004), indicating a serious pricing problem for publicly provided goods and services economy-wide. As far as financial subsidies are
concerned, they reflect spending on four key areas: food, fertiliser, petroleum and electricity. Financial subsidies on food, fertiliser and petroleum are provided through the federal government budget and account for some 95% of the total budgetary subsidy. Subsidy on electricity is provided by state governments to farmers for pumping groundwater. This is done by controlling electricity price for farmers. The rate of subsidy varies considerably by state ranging from 100% (free power) to 10% (in West Bengal). The resultant subsidy is in some cases incorporated directly in the state budget and in some cases financed off-budget. These massive subsidies are often unnecessarily high and not well-targeted – largely benefiting the higher income group.

Not surprisingly, much of the crunch on budget has fallen on public capital spending. At both the federal and state government levels, the burden of adjustment to the resource constraint has fallen disproportionately on capital spending. This is dramatically indicated by the slide in capital spending from 8% of GDP in 1980 to below 3% in 2000. As a share of total spending, capital spending fell from 31% to less than 4% over the same time period. There has been some recovery recently, but public investment spending is far below what is needed for supporting rapid sustainable growth and poverty reduction (Ahmed 2006). For example, India’s public health spending is a meagre 1.3% of GDP and compares poorly internationally (World Bank 2005b): average spending in low and middle income economies is 2.7% of GDP whereas this spending is 6.6% in high income economies. Education spending increase has contributed to improvements in school enrolments, particularly at the primary level. And overall literacy rates have also increased. Nevertheless, access to secondary education remains low. Overall education quality is low, as reflected by high student to teacher ratio, low quality of teachers, large teacher absenteeism, poor availability of teaching materials and supply (World Bank 2006, 2003). In 2005, India’s spending on infrastructure was just a little over 3.5% of GDP. By contrast, China’s was 6% while Chile’s 7% or so of GDP (Hamm 2007).

The effects of government expenditure composition on economic development have received considerable attention among policymakers and researchers. A number of recent empirical studies, based on country-level data sets, have found that the share of government spending on public goods, such as health, education and basic infrastructure, has a statistically significant and positive impact and that on non-public or private goods (subsidies) has a significantly negative effect on growth, income and poverty reduction. These include the work by Lopez and Galinato (2007) based on experience from the rural sector in 15 Latin American countries and that by Lopez and Miller (2007) based on national data from 29 middle income countries. Lopez and Torero (2007) found that the share of government expenditures on social public goods has positive and significant effect on mean household income, especially in low-income countries, implying a pro-equity effect. Fan et al (2000) also found that public spending on research and development, irrigation, roads, education and rural development has a statistically significant effect in reducing rural poverty and increasing total factor productivity in agriculture in India. World Bank (2004) looks at the overall effectiveness of public spending in agriculture in raising farm productivity and lowering poverty and concludes that public spending on rural infrastructure (roads, irrigation schemes, electricity) and research are much more effective than spending on subsidies.

This paper aims to empirically document the growth and poverty reduction effects of the share of public goods spending in total government expenditures based on experiences from 14 major states in India. Consistent with previous research findings, our results show that fiscal policies regarding spending on public goods have dramatic influences on growth and poverty reduction. Increasing the share of government spending on public goods at the state level would produce a substantially positive impact on growth of state GDP per capita. And increasing the share of government spending on social public goods such as education and health would have a significant and positive impact on poverty reduction as measured by the headcount poverty index.

2 Analytical Framework

The economic output of state (Y) can be expressed as a function of capital input (K), labour input (L) and technology or productivity (A)²

\[ Y = A \times F(K, L) \]

Based on the classic assumption of a competitive economy, equation (1) can be transformed into the following:

\[ \Delta y/y = \Theta \times \Delta k/k + \Delta A/A \]

where \( y \) is per capita output and \( k \) is per capita capital.

Equation (2) states that technical progress and capital accumulation are the main determinants of per capita GDP growth. A generalised form of equation (2) is

\[ \Delta y/y = G(\Delta k/k, \Delta A/A) \]

Technical progress or productivity growth (\( \Delta A/A \)) is affected by government fiscal policies. In general, government spending intensity on public and semi-public goods such as basic infrastructure, health and education has positive marginal effects on productivity growth (Lopez and Galinato 2007; Thomas 2006; Lewis 2004; Gill, Kharas et al 2006). We use three variables to measure such spending intensity: the share of public goods spending in total expenditures, the share of other developmental spending, and total expenditures as percentage of state GDP (GSDP). Controlling the share of total expenditures in GSDP, an increase in the share of public goods spending would help boost productivity growth, while an increase in the share of other developmental spending could boost productivity growth as well but to a lesser extent, depending on the structure of the spending. On the other hand, a higher share of total expenditures in GSDP could crowd out private investment in research and development (R&D) and technology and hence could exert a negative effect on productivity growth, depending on how an increase in
Productivity growth is also affected by the social, economic and geographic conditions of the state, such as trade openness and proximity to coastal lines. We use two variables to capture these conditions: India's trade to GDP ratio as a measure of trade openness, and a geographic location dummy variable used to capture the proximity of a state to coastal lines. It is expected that trade to GDP ratio and geographic dummy would have a positive effect (a dummy value of 1 denotes coastal states).

Thus, productivity growth can be expressed by the following equation:

\[
\Delta A/A = A(\text{PU, OTHR, EXP, TRD, GGM}) \quad \ldots (4)
\]

where \(\text{PU}\) is the share of state government expenditures on public goods in total state government expenditures; \(\text{OTHR}\) is the share of state other developmental expenditures in total state government expenditures; \(\text{EXP}\) is the share of state government expenditures in GDP; \(\text{TRD}\) is national trade to GDP ratio; and \(\text{GGM}\) is a geographic location dummy, with 1 indicating coastal states while 0 representing non-coastal states.

Capital accumulation \(\Delta k/k\) data for the sample states are unavailable. However, it is quite common to use investment to GDP ratio as a proxy for capital accumulation. Since data on state investment are also unavailable, we use national investment timed by state dummy as a proxy for state investment. Hence, the following equation can be obtained:

\[
\Delta k/k = \xi I/GSDP^S \quad \ldots (5)
\]

where \(\xi\) is an adjustment coefficient, \(I\) is national investment and \(S\) is state dummy. Denoting \(px=I/GSDP^S\), equation (5) can be rewritten as follows:

\[
\Delta k/k = \xi px \quad \ldots (6)
\]

Plugging equation (6) and (4) into (3), per capita GDP growth rate can be expressed as:

\[
\Delta y/y = H(px, \text{PU, OTHR, EXP, TRD, GGM}) \quad \ldots (7)
\]

Federal fiscal policies affect state growth rate as well but are not included as explanatory variables since the purpose is to study the growth effects of state fiscal policies. The effects of federal fiscal policies, along with those of other external conditions variables such as world energy prices, business cycles, etc, can be captured by using time dummy variables (more on time dummy in Section 5). McCracken (2006) used the same treatment in studying the growth effects of fiscal policies in the states of the United States and achieved satisfactory results. Lopez and Miller (2007) and McCracken (2006) find that both tax policies and initial GDP per capita have significant impact on growth rate. But our sample data shows that more than 90% of the variation of the share of taxes in GDP and that of initial GDP per capita can be explained by the share of total expenditures in GDP and the 14 investment proxy variables (the respective R-squared equal to 0.9056 and 0.9956). Thus we exclude tax or initial GDP per capita variables from equation (7).

From equation (7) the following econometric estimation model is specified:

\[
(\Delta y/y)_{it} = \sum \alpha_i px_{jt} + \alpha_i pu_{jt} + \alpha_i othr_{it} + \alpha_i \text{EXP}_{it} + \alpha_i \text{TRD}_{it} + \alpha_i \text{GGM}_{it} + \nu_i + \mu_t + \epsilon_{it} \quad \ldots (8)
\]

where subscript \(i\) indicates state \(i\) and subscript \(t\) indicates year \(t\). The \(\epsilon_{it}\) is a random disturbance that is independently distributed with zero-mean and identical variance. And \(\nu_i\) and \(\mu_t\) are fixed state and time effects, respectively.

To estimate equation (8), we denote per capita GDP growth as the log difference of GDP per capita. To capture the lagged effects of the various explanatory variables on the dependent variable, and considering the volatile nature of growth, we use five-year moving average rather than the individual-year value in the estimation. Using moving average might help capture what are considered long-term effects of fiscal spending variables on per capita GDP growth rate. Moving average is more favourable than simple average because it does not reduce number of observations dramatically. Using \([\ ]\) as a sign of five-year moving average, the first equation to be estimated is as follows:

\[
[\ln(y_{it}) - \ln(y_{i(t-5)})] = \sum \alpha_i [px_{jt}] + \alpha_i [pu_{jt}] + \alpha_i [othr_{jt}] + \alpha_i [\text{EXP}_{it}] + \alpha_i [\text{TRD}_{it}] + \alpha_i [\text{GGM}_{it}] + \nu_i + \mu_t + \epsilon_{it} \quad \ldots (9)
\]

3 The Data

We use data for 11 states from 1990 to 2002 and for three states from 1990 to 1999 in the estimation of equation (9). Each of the three states (Bihar, Madhya Pradesh and Uttar Pradesh) were split into two in 2000 so their data after 1999 are not comparable with those prior to 1999. All the raw data are from the South Asia Region of the World Bank, except a few national level data which are from the World Bank Central Database.

Based on the analytical taxonomy that was proposed by Lopez (forthcoming) and used in Lopez and Galinato (2007) and on expenditure items as defined in the fiscal accounts, we group Indian government expenditures into public goods expenditures and other expenditures. Public goods expenditures include expenditures on education, sports, art and culture plus that on medical and public health and family welfare; transport and communications; power and irrigation; and rural development. Other developmental expenditures include all state spending, including subsidies, except spending on public goods, general services such as government administration, debt services and reserves, and developmental loans. Total government expenditures include all government expenditures except developmental loans, which have been a small part of overall expenditures and have been declining steadily over time.

We further split public goods expenditures into social public goods spending and non-social public goods spending. Social public goods expenditures are defined as state spending on education, sports, art and culture plus that on medical and public health and family welfare. Non-social public goods expenditures
are defined as state spending on rural development, irrigation and flood control, and transport and communication, plus state capital expenditures on power development.

In our definition, federal government fiscal transfers and state share in federal taxes are included in state expenditures and taxes and excluded from federal expenditures and taxes, respectively.

Table 1 gives a summary of the five-year moving averages of these shares by state as well as in total, which show significant variations. Taking all the samples as a whole, the share of public goods expenditures in total government expenditures ranges from 31.2% to 50.1%, with the average at 42.4%; the share of other developmental expenditures in total government expenditures varies from 15.6% to 34.1%, with an average of 22.6%; the share of social public goods spending ranges from 18.4% to 31.2%, averaging 23.3%; and the share of non-social public goods spending ranges from 9.3% to 29.2%, with an average of 19.1%. Overall, the state government expenditures as a percentage of gsdp range from 12.7% to 29%, with the average at 18.7% (not shown in Table 1).

### Table 1: Summary Statistics of Key Variables (Five-year moving average: 1990-2002)

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<tr>
<td>Andhra Pradesh</td>
<td>Mean 0.043 0.430 0.226 0.344 0.205 0.225</td>
<td>Minimum 0.030 0.381 0.198 0.320 0.187 0.187</td>
<td>Maximum 0.066 0.457 0.259 0.372 0.225 0.256</td>
<td>Minimum -0.031 0.416 0.162 0.334 0.243 0.139</td>
<td>Maximum 0.027 0.495 0.229 0.409 0.286 0.251</td>
<td>Maximum 0.098 0.501 0.277 0.357 0.226 0.278</td>
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<tr>
<td>Bihar</td>
<td>Mean 0.004 0.448 0.188 0.364 0.261 0.187</td>
<td>Minimum -0.031 0.416 0.162 0.334 0.243 0.139</td>
<td>Maximum 0.027 0.495 0.229 0.409 0.286 0.251</td>
<td>Maximum 0.098 0.501 0.277 0.357 0.226 0.278</td>
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<tr>
<td>Gujarat</td>
<td>Mean 0.044 0.457 0.239 0.304 0.216 0.241</td>
<td>Minimum 0.009 0.397 0.212 0.278 0.193 0.204</td>
<td>Maximum 0.098 0.501 0.277 0.357 0.226 0.278</td>
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<td>Haryana</td>
<td>Mean 0.029 0.435 0.250 0.315 0.197 0.238</td>
<td>Minimum 0.009 0.388 0.212 0.273 0.188 0.197</td>
<td>Maximum 0.043 0.492 0.297 0.378 0.207 0.292</td>
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<td>Karnataka</td>
<td>Mean 0.051 0.433 0.235 0.332 0.228 0.205</td>
<td>Minimum 0.038 0.392 0.225 0.304 0.222 0.160</td>
<td>Maximum 0.070 0.463 0.246 0.376 0.236 0.241</td>
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<tr>
<td>Kerala</td>
<td>Mean 0.045 0.416 0.213 0.372 0.289 0.126</td>
<td>Minimum 0.034 0.397 0.173 0.338 0.257 0.114</td>
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<tr>
<td>Madhya Pradesh</td>
<td>Mean 0.054 0.439 0.247 0.423 0.312 0.142</td>
<td>Minimum 0.030 0.409 0.281 0.311 0.206 0.203</td>
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<td>Maharashtra</td>
<td>Mean 0.044 0.456 0.204 0.340 0.226 0.230</td>
<td>Minimum 0.018 0.411 0.172 0.310 0.219 0.167</td>
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<td>Orissa</td>
<td>Mean 0.018 0.425 0.220 0.355 0.217 0.208</td>
<td>Minimum -0.003 0.373 0.183 0.308 0.209 0.152</td>
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<tr>
<td>Punjab</td>
<td>Mean 0.041 0.455 0.270 0.420 0.229 0.241</td>
<td>Minimum 0.018 0.312 0.182 0.323 0.184 0.117</td>
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<tr>
<td>Rajasthan</td>
<td>Mean 0.037 0.441 0.216 0.343 0.241 0.200</td>
<td>Minimum -0.012 0.387 0.191 0.306 0.225 0.141</td>
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<tr>
<td>Tamil Nadu</td>
<td>Mean 0.049 0.451 0.239 0.414 0.248 0.343</td>
<td>Minimum 0.028 0.335 0.211 0.300 0.234 0.093</td>
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<tr>
<td>Uttar Pradesh</td>
<td>Mean 0.061 0.389 0.341 0.452 0.270 0.119</td>
<td>Minimum 0.020 0.448 0.172 0.380 0.241 0.207</td>
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<tr>
<td>West Bengal</td>
<td>Mean 0.043 0.430 0.199 0.371 0.279 0.151</td>
<td>Minimum 0.023 0.377 0.168 0.330 0.262 0.115</td>
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<tr>
<td>Total</td>
<td>Mean 0.054 0.448 0.238 0.436 0.297 0.172</td>
<td>Minimum -0.031 0.312 0.156 0.273 0.184 0.099</td>
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### 4 Estimation and Results

Estimation of equation (9) may involve endogeneity and simultaneity problems. Especially, fiscal policy variables in the right hand side of the equation, namely, share of spending on public goods, share of other developmental spending, and share of total expenditures in gsdp, may be affected by growth rate and correlated with the error term in the equation. We use the instrumental variable estimation approach to control for possible bias from such problems. Based on data availability, instruments we used include share of federal spending on public goods, share of federal other developmental spending, share of federal expenditures in gdp, and share of federal tax revenues in gdp. These variables constitute the external environment in which state economy operates but are independent of state characteristics. Jaffe (1986) demonstrates that external environment type of variables could potentially be effective instruments. Hu, Jefferson and Qian (2005) used such instruments in estimating the effects of firm-level R&D activities. Additional instruments we used include state initial access to safe water, to electricity, urban population as a percentage of total population in 1990, and literacy rate in 1991. These initial-level variables are correlated with expenditure share variables but presumably do not have significant effects on growth rate several years back or into the future except through affecting fiscal spending shares. This is likely to be especially true considering India’s rapid growing economy.

We use several tests to check for the adequacy of the instruments. The Hansen-Sargan test of overidentifying restrictions as reported in column 1 in Table 2 (p 106) shows that we cannot reject the null that the instruments chosen are not correlated with the error term, or the instruments are valid. Sargan test further rejects the endogeneity of the instruments in the first stage regressions one by one. The F-statistics of all first stage regressions are high and larger than 20. This implies that the bias of the estimated coefficients is at most 5%. And the correlation coefficients between instruments and instrumented variables are large as well (about 0.4 or higher). These two aspects show that the potential small and large sample biases are not substantial.

To address potential biases due to omitted variables, we further use fixed effects and random effects instrumental variable estimation methods. Both instruments and instrumented variables are defined as same under simple instrumental variable approach, as reported in column 2 of Table 2. The Hausman test confirms that the instruments are valid. And the fixed effects analysis indicates that we cannot reject the null that all fixed error components are jointly zero, while the random effect estimates are
perfectly consistent with those derived from simple instrument variable method (column 1), both in terms of sign, magnitude, and significance of the estimates. These results imply that the estimates do not have substantial biases caused by omitted variables.

The robustness of the model is further confirmed by the right signs, magnitude and significance of the estimates for the coefficients of the explanatory variables. As expected, shares of public goods expenditures, trade openness, and all investment proxies show a very significant and positive effect on growth rate. Share of other developmental expenditures has a significant and positive growth effect as well but the effect is much smaller than that of the share of public goods spending, possibly a reflection of the existence of subsidies in other developmental expenditures. The coefficient for geographical location dummy is not significant but has the right positive sign. And the share of state expenditures in gsdp rightly shows a negative effect on growth though insignificant. Especially, the coefficient of the trade openness index implies that an increase of national trade to gdp ratio by 10 percentage points could help raise gsdp per capita growth rate by 2.5 percentage points.

The most important result is that both the share of public goods and that of other developmental expenditures in total government expenditures have a very positive and statistically significant effect on per capita gdp growth, though the size of the effect of the former is about twice as large as the latter. This implies that reallocating funds from either other developmental expenditures or non-developmental expenditures to public goods activities has a significant positive impact on growth of gsdp per capita. Raising the share of public goods expenditures by 10 percentage points via reallocating equal percentages of funds from other developmental expenditures and non-developmental expenditures, for example, per capita gsdp growth rate could increase by 3.5 percentage points. This is broadly comparable with findings from the study by Lopez and Miller (2007) which was based on country-level data.

In the sample the share of public goods expenditures in total expenditures ranges from 31.2% to 50.1%, with the average at 42.4% (Table 1). This indicates that the share of public goods expenditures could on average be realistically raised by 7.7 percentage points (50.1-42.4). Consequently, per capita gsdp growth rate could on average be increased by 2.7 percentage points through reallocation of fiscal funds.

### 5 Impact on Poverty Reduction

Lopez and Galinato (2007) show that the per capita income of the rural poor in 15 Latin American countries is significantly affected by the share of government spending on subsidies to private goods in total expenditures in the rural sector. There are also ample studies in the literature which find that agriculture development and inflation have a positive and negative impact on poverty, respectively. Thus, we assume that poverty rate in a state is affected by the following four factors: (1) the share of state government expenditures on public goods in total state government expenditures; (2) state agriculture GDP as a percentage of total GDP; (3) India’s national inflation rate; and (4) gsdp per capita. For example, the share of public goods expenditures in total expenditures affects the poverty rate through impacting health, education and other factors related to human capital development for the poor, through affecting direct poverty reduction programmes, and through reducing the subsidies to the rich, and thus is expected to have a positive effect on poverty reduction.

The poverty effect model can be specified as follows:

\[
\Pi_l = \alpha_0 + \alpha_1 \ln(y_{it}) + \alpha_2 D_{it} + \alpha_3 P_{Uit} + \alpha_4 F_{it} + \nu_i + \mu_t + \epsilon_{it} \quad \text{(10)}
\]
Dependent Variable: Headcount poverty index


Comparative poverty data that are available include headcount index data of six observations per state for different years from

| Table 3: Instrumental Variables Estimation of Poverty Reduction Effects of Public Goods Spending Shares, Dependent Variable: Headcount Poverty Index (percentage points, under the national poverty line) |
|---|---|---|---|
| IV | IV-RE | IV-RE | IV-RE |
| Social expenditures, share in state expenditures\(^2\) | -105.149** (-2.55) | -81.214* (1.67) |
| Non-social expenditures, share in state expenditures\(^3\) | 44.527 (1.14) |
| Public goods expenditures, share in state expenditures\(^4\) | -21.504 (0.40) |
| State agriculture GDP as % of total state GDP | -0.279 (0.85) | -0.353 (0.97) | -0.318 (0.85) | -0.176 (0.53) |
| Log of state GDP per capita | -13.257** (-2.18) | -9.451** (-2.22) | -8.050* (-1.66) | -11.654** (-2.53) |
| India inflation rate (consumer prices) | 0.665 (1.41) | 0.754*** (2.69) | 0.901*** (3.39) | 0.890*** (3.48) |
| Constant | 188.463*** (2.68) | 150.819*** (3.44) | 107.522** (2.16) | 153.288*** (2.99) |
| Observations | 72 | 72 | 72 | 72 |
| Number of states | 12 | 12 | 12 | 12 |
| Hansen-Sargan test | 0.6339 |
| Minimum value of F-statistics of all first stage regressions | 7.13 |
| Hausman test | 0.5037 | 0.6330 | 0.9459 |

Absolute value of z-statistics in brackets (robust z-statistics for IV).

\* significant at 10%, ** significant at 5%, *** significant at 1%

Instrumented: state agriculture GDP as % of total state GDP and shares of social, non-social and total public goods expenditures.

Excluded instruments: log of initial literacy rate (1991) and time dummies, selected based on similar principles used in the growth model. The Hansen-Sargan test and Hausman tests for the four specifications are all passed comfortably, indicating that the adequacy of the instruments chosen cannot be rejected. Sargan test further rejects the endogeneity of the instruments in the first stage regressions one by one under the simple instrumental variable estimation method. The F-statistics of all first stage regressions are larger than 10 except for the social public goods spending equation, which has an F-statistic value of 7.13. And the correlation coefficients between instruments and instrumented variables are large as well (about 0.4 or higher).

The results confirm that per capita GDP has a significant and positive impact on poverty reduction (the negative coefficient indicates reduction of headcount poverty index), while inflation has a significant and negative effect on poverty reduction. Agriculture GDP share in total GDP does not show a significant impact, but its negative coefficient is not inconsistent with empirical findings that agriculture sector development is good for poverty reduction. The fact that these results are quite robust across the four different specifications of the model provides a fairly good level of confidence in the validity of the results, though the number of observation is relatively small at 72 (Table 3).

A remarkable result is that the share of public social goods expenditures in total state government expenditures demonstrates a large and significant positive impact on poverty reduction. In the poverty regression sample the share of social public goods expenditures in total expenditures ranges from 18% to 32%, with the average at 23.9%. It could on average be realistically raised by 8.1 percentage points (32.00-23.9), as a result of which the poverty headcount index could on average be reduced by 6.6 percentage points ((8.1/100)×81.2). The poverty headcount index in the sample ranges from 28.8 to 65.1, with an average of 42.4. This is consistent with findings from Lopez and Torero (2007) and Fan et al (2000).

6 Conclusions

Using panel data from 14 Indian states from 1990 to 2002 and based on categorising government expenditures into social public goods, non-social public goods, and public goods spending and other developmental expenditures, the paper finds econometric evidence that state government fiscal policies have important implications for per capita GDP growth at the state level. The

fiscal year 1986 to 1993 in 12 states. Poverty data for the states of Haryana and Punjab are unavailable because the data for the two states are combined together and thus unusable for the purpose of the analysis. Given the debate on the possible too optimistic estimation for poverty reduction in India for the years after fiscal 1993 (nss Round 50) (see Deaton and Kozel 2004), the sample does not include any poverty data after fiscal year 1993 (poverty data for fiscal year 2005 is comparable but do not match in timeline with other data in the data set). All the poverty headcount index data are from Datt (1997, 1999) collected in the database of the South Asia Region of the World Bank. The data are based on India’s national poverty line of Rs 49 per capita per month at October 73-June 74 rural prices. Percentage points rather than per cent are used as the units for these headcount indices in the estimation.

Table 3 provides the estimation results. Column 1 and 2 are the results for the effect of social public goods, derived using simple instrumental variable and random effects instrumental variable methods, respectively, and column 3 and 4 are the effects of non-social public goods and total public goods, based on random effects instrumental variable method. Again, the spending share variables here are potentially endogenous and there is reverse causality concern in the model. So we use the instrumental variable estimation method. The instruments include log of initial literacy rate (1991) and time dummies, selected based on similar principles used in the growth model. The Hansen-Sargan test and Hausman tests for the four specifications are all passed comfortably, indicating that the adequacy of the instruments chosen cannot be rejected. Sargan test further rejects the endogeneity of the instruments in the first stage regressions one by one under the simple instrumental variable estimation method. The F-statistics of all first stage regressions are larger than 10 except for the social public goods spending equation, which has an F-statistic value of 7.13. And the correlation coefficients between instruments and instrumented variables are large as well (about 0.4 or higher).

The results confirm that per capita GDP has a significant and positive impact on poverty reduction (the negative coefficient indicates reduction of headcount poverty index), while inflation has a significant and negative effect on poverty reduction. Agriculture GDP share in total GDP does not show a significant impact, but its negative coefficient is not inconsistent with empirical findings that agriculture sector development is good for poverty reduction. The fact that these results are quite robust across the four different specifications of the model provides a fairly good level of confidence in the validity of the results, though the number of observation is relatively small at 72 (Table 3).

A remarkable result is that the share of public social goods expenditures in total state government expenditures demonstrates a large and significant positive impact on poverty reduction. In the poverty regression sample the share of social public goods expenditures in total expenditures ranges from 18% to 32%, with the average at 23.9%. It could on average be realistically raised by 8.1 percentage points (32.00-23.9), as a result of which the poverty headcount index could on average be reduced by 6.6 percentage points ((8.1/100)×81.2). The poverty headcount index in the sample ranges from 28.8 to 65.1, with an average of 42.4. This is consistent with findings from Lopez and Torero (2007) and Fan et al (2000).

6 Conclusions

Using panel data from 14 Indian states from 1990 to 2002 and based on categorising government expenditures into social public goods, non-social public goods, and public goods spending and other developmental expenditures, the paper finds econometric evidence that state government fiscal policies have important implications for per capita GDP growth at the state level. The
share of public goods expenditures in total state government expenditures has a large positive and significant impact on per capita GSDP growth. Reallocation of funds to increase the share of public goods expenditures could on average reduce the poverty headcount index by up to 6.6 percentage points.

Another finding is that state fiscal policies also have significant impacts on poverty reduction. Using the same classification of expenditure items and based on econometric analysis of data from 12 Indian states, with each state having six time-series observations, the paper shows that the share of social public goods expenditures in total state government expenditures has a significant and positive impact on poverty reduction: Reallocations of funds to increase in the share of social public goods expenditures could on average reduce the poverty headcount index by up to 6.6 percentage points.

These findings are consistent with findings from similar recent studies that were based on country-level data and used various different methods, such as Lopez and Miller (2007), Lopez and Galinato (2007), Lopez and Torero (2007) and Fan et al (2000), as mentioned in Section 1 and 5.

As a first effort, this paper is mainly based on traditional growth accounting models. It does not explore the impact of factor mobility among states, which in general is much easier than that across countries. To gain a deeper understanding of the effects, future research might need to explore the use of a factor mobility model (McCracken 2006).

Fiscal policies are affected by not only economic but also political and social factors, such as political competition, election, ruling party, corruption, etc. It is worthwhile to try to use political and social factors as instruments in further research when data become available. Lopez and Miller (2007) used such instruments in a study based on country-level data and achieved satisfactory results.

NOTES

1 There is now recognition of the dangers of relying on government data and since 2003, serious efforts are underway to contain them. As a result, in 2007-08 the fiscal deficit is estimated to have fallen to 5.1% of GDP, interest cost has reduced to 5.6% and debt/GDP ratio has declined to 79%.

2 As an example, Brierly and Feiock (1993) used this specification in their study of the economic growth of US states.

3 Much of India's deficits were financed through non-bank domestic sources, which tend to crowd out private investment by raising domestic interest rates. Pinto and Zahir (2003) conclude that there is indeed evidence that large fiscal deficits in India have put pressure on real interest rates and crowded out private investment. Other studies also reached similar conclusions (Reynolds 2001; World Bank 2000). In the past, government control over interest rates through dominant public sector banking made it easier to divert resources to the public sector at low cost. With the gradual liberalisation of the financial markets, as has taken place recently, the crowding out effects could become more severe than in the past.

4 Here we used the same test methods as used in Lopez and Miller (2007).

5 \[0.434 \times 0.212 \times 0.226 + (0.226 + 0.351) \times 0.212 = 0.351\times 0.212 = 0.779 = 0.268\]

6 Lopez and Miller found that a 10 percentage points increase in the share of public goods expenditures may raise the immediate per capita GDP growth rate by 2.22 percentage points, while raising the long-term growth rate by 3.14 percentage points. These are slightly lower than 3.5 as reported here. But this is consistent with the fact that the definition of public goods here is more concentrated on higher growth effect items such as education, health and basic infrastructure, based on different data sets but on the same principles, as compared to Lopez and Miller (2007).

7 \[0.434 \times 0.212 \times 0.226 + (0.226 + 0.351) \times 0.212 = 0.268\]

See footnote 3 for explanations of the formula and the figures used in it.

REFERENCES


