

POLICY RESEARCH WORKING PAPER

WPS 1608

1608

# Fiscal Decentralization, Public Spending, and Economic Growth in China

*Tao Zhang*  
*Heng-fu Zou*

Fifteen years of efforts to promote fiscal decentralization in China have failed to promote economic growth in China's provinces. This finding is surprising in the light of arguments that fiscal decentralization usually promotes provincial or local economic growth.

The World Bank  
Policy Research Department  
Public Economics Division  
May 1996



## Summary findings

Zhang and Zou use data on China to demonstrate how the allocation of fiscal revenue and expenditures between central and local governments has affected economic growth since reforms that began in the late 1970s.

They find a higher degree of fiscal decentralization associated with lower provincial economic growth over the past 15 years in China. This implies that fiscal

reforms begun in China in the early 1980s have probably failed to promote the country's economic growth.

This result is consistently significant and robust in their empirical examinations. It is also surprising, in the light of the argument that fiscal decentralization usually contributes positively to provincial or local economic growth.

---

This paper — a product of the Public Economics Division, Policy Research Department — is part of a larger effort in the department to study fiscal decentralization and economic growth. The study was funded by the Bank's Research Support Budget under the research project "Fiscal Decentralization and Economic Growth" (RPO 680-02). Copies of this paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Cynthia Bernardo, room N10-053, telephone 202-473-7699, fax 202-522-1154, Internet address [prdpe@worldbank.org](mailto:prdpe@worldbank.org). May 1996. (46 pages)

*The Policy Research Working Paper Series disseminates the findings of work in progress to encourage the exchange of ideas about development issues. An objective of the series is to get the findings out quickly, even if the presentations are less than fully polished. The papers carry the names of the authors and should be used and cited accordingly. The findings, interpretations, and conclusions are the authors' own and should not be attributed to the World Bank, its Executive Board of Directors, or any of its member countries.*

# Fiscal Decentralization, Public Spending, and Economic Growth in China\*

Tao Zhang and Heng-fu Zou

Policy Research Department, World Bank

---

\*We thank Hamid Davoodi, Shantayanan Devarajan, Gang Fan, Bert Hofman, John H. Jia, Hongyi Li, Stephen McGurk, Richard Newfarmer, Yingyi Qian, Terry Sicular, Christine Wong, and Danyang Xie for their comments and suggestions. The authors also acknowledge financial assistances from the Washington Center of China Studies, Ford Foundation, and the World Bank (Research grant RPO #680-02).



# 1 Introduction

Many developing countries and transitional economies have a mandate to decentralize some aspects of their public finance. In addition, many developed economies such as the United States, the United Kingdom, and Canada are reviving their policy debates on devolution. Decentralization of expenditure and revenue decisions of the central government is seen as part of a package to improve the efficiency of the public sector, cut the budget deficit, and promote economic growth (Bird and Wallich, 1993; Bahl and Linn, 1992; Rivlin, 1992; Gramlich, 1993; Oates, 1993; and Bird, 1993). The argument is that decentralization will increase economic efficiency since local governments are better positioned to deliver public services that match local preferences and needs than the national government (Oates, 1972). Over time, efficiency gains will lead to fast local as well as national economic growth.

This wisdom is shared by numerous studies on intergovernmental fiscal relations in China (Bahl and Wallich, 1992; World Bank, 1990, 1992, 1995). Many proposals favor assigning more revenue and expenditure responsibilities to localities from the center. However, a concern has emerged that decentralization in China has been implemented too fast and has gone too far, and that this is threatening macroeconomic control and stability. Furthermore, in this process, national priorities in public spending have often been crowded out by local public projects.

Despite the foregoing policy concerns, there has been no empirical at-

tempt to explore the relationship between fiscal decentralization and economic growth in developing countries in general and China in particular. In this paper, we use the Chinese case to demonstrate how the allocation of fiscal revenues and expenditures between the central government and local governments has affected economic growth since reforms of the late 1970s.

The outline of this paper is as follows. A theoretical model of fiscal decentralization and growth is laid out in the next section. Section 3 summarizes the trends in fiscal allocations between the center and provincial governments. Section 4 contains the empirical application of the theoretical model to the Chinese economy. Section 5 concludes the paper.

## 2 A Growth Model with Different Levels of Government Spending

Following Barro (1990)<sup>1</sup>, we begin with an endogenous growth model consisting of a production function with two inputs: production capital and public spending where the function exhibits constant returns to scale in the two inputs. We depart from the Barro model by assuming that public spending is carried out by two levels of government: central and provincial governments. Let  $k$  be the capital stock,  $g$  the total government spending,  $f$  central government spending and  $s$  local government spending:

$$f + s = g \tag{1}$$

---

<sup>1</sup>Some related models are presented in Devarajan, Swaroop and Zou (1993), and Davoodi, Xie, and Zou (1995).

The production function is CES:

$$y = [\alpha k^\phi + \beta f^\phi + \gamma s^\phi]^{1/\phi}, \quad -\infty < \phi < 1 \quad (2)$$

where  $\alpha$ ,  $\beta$ , and  $\gamma$  are all in  $(0, 1)$  and  $\alpha + \beta + \gamma = 1$ . The CES production functions include the Cobb-Douglas specification as a special case ( $\phi = 0$ ). The introduction of public spending by different levels of government creates a potential link between fiscal decentralization (i.e. differential effects of spending by the two levels of government) and growth. As in Barro (1990), when specifying the production function we abstract from human capital and labor, but we allow for these additional inputs in the empirical work.

The consolidated government spending  $g$  is financed by a flat output tax at rate  $\tau$  :

$$g = \tau y \quad (3)$$

To derive the long-run growth rate of the economy, we first analyze the decisions made by the production-consumption sector. We consider a long-lived producer-consumer unit which maximizes its discounted utility,

$$\max \int_0^\infty \left[ \frac{c^{1-\sigma} - 1}{1-\sigma} \right] e^{-\rho t} dt \quad (4)$$

where  $c$  is the consumption of a single good produced in this economy;  $\sigma$  is the inverse of the intertemporal elasticity of substitution; and  $\rho$  is the rate of time preference.

The dynamic budget constraint for the producer-consumer unit is:

$$\dot{k} = (1 - \tau) [\alpha k^\phi + \beta f^\phi + \gamma s^\phi]^{1/\phi} - c, \quad k_0 \text{ given.} \quad (5)$$

The producer-consumer unit takes as given the government's announcement of the fixed tax rate  $\tau$ , the spending at different levels of governments,  $f$  and  $s$ . It then chooses optimally the consumption path  $\{c(t) : t \geq 0\}$  and the path of the capital stock  $\{k(t) : t \geq 0\}$ . To characterize the producer-consumer unit's optimal allocation of resources, we write down the Hamiltonian:

$$H = \left[ \frac{c^{1-\sigma} - 1}{1-\sigma} \right] + \lambda \left\{ (1-\tau) [\alpha k^\phi + \beta f^\phi + \gamma s^\phi]^{1/\phi} - c \right\} \quad (6)$$

The first order conditions are given by,

$$c^{-\sigma} = \lambda \quad (7)$$

$$\dot{\lambda} = \rho\lambda - \lambda\alpha(1-\tau) [\alpha k^\phi + \beta f^\phi + \gamma s^\phi]^{(1-\phi)/\phi} k^{\phi-1} \quad (8)$$

The transversality condition is  $k\lambda e^{-\rho t} \rightarrow 0$  as  $t$  approaches infinity.

Equations (5), (7), (8) with the initial transversality conditions determine the producer-consumer unit's optimal responses. One immediate result from these equations is that the growth rate of consumption is given by,

$$\frac{\dot{c}}{c} = \frac{r(\mathbf{x}) - \rho}{\sigma} \quad (9)$$

where  $\mathbf{x}$  denotes the vector  $(k, f, s, \tau)$ ;  $r(\mathbf{x})$  has the interpretation of the real interest rate and is defined by

$$r(\mathbf{x}) = \alpha(1-\tau) [\alpha k^\phi + \beta f^\phi + \gamma s^\phi]^{(1-\phi)/\phi} k^{\phi-1}. \quad (10)$$

Let us define the spending shares for the central and local governments as  $\varphi_f$  and  $\varphi_s$ , respectively:

$$\varphi_f = \frac{f}{g}, \varphi_s = \frac{s}{g}. \quad (11)$$



Then, we can solve the long-run growth rate,  $G$ , of the economy explicitly as spending shares, income tax, and other exogenous factors:

$$G = \frac{\alpha(1-\tau)}{\sigma} \left[ \frac{\alpha\tau^{-\phi}}{\tau^{-\phi} - \beta\varphi_f^\phi - \gamma\varphi_s^\phi} \right]^{\frac{1-\phi}{\phi}} - \frac{\rho}{\sigma}. \quad (12)$$

Thus, the allocation of public spending among different levels of government can affect the rate of economic growth as seen from equation (12). To examine how the long-run growth rate responds to various spending shares and income taxation, we assume that the government's objective is to maximize the growth rate in (12) by choosing  $\tau$ ,  $\varphi_f$  and  $\varphi_s$ . This is the same as maximizing the producer-consumer unit's consumption growth (which coincides with the rate of growth of output and capital) in (9) subject to the government budget constraint of (3). Hence the problem can be formulated as follows:

$$\max_{f,s,\tau} \frac{r(\mathbf{x}) - \rho}{\sigma} \quad (13)$$

$$\text{subject to: } f + s \leq \tau \left[ \alpha k^\phi + \beta f^\phi + \gamma s^\phi \right]^{1/\phi} \quad (14)$$

The growth-maximizing tax rate is given in the following equation:

$$\frac{\tau^{1-\phi}}{\phi\tau + (1-\phi)} = \Pi^{1-\phi} \quad (15)$$

where  $\Pi = \beta^{1/(1-\phi)} + \gamma^{1/(1-\phi)}$ .

The growth-maximizing shares of the central and local government spending are given by,

$$\varphi_f^* = \frac{\beta^{1/(1-\phi)}}{\Pi} \quad (16)$$

$$\varphi_s^* = \frac{\gamma^{1/(1-\phi)}}{\Pi} \quad (17)$$

From the results above, we can obtain the real interest rate  $r(\mathbf{x})$  as follows:

$$r(\mathbf{x}) = \alpha(1 - \tau)(y/k)^{1-\phi} = \alpha(1 - \tau) \left\{ \frac{\alpha\Pi^\phi}{\Pi^\phi - \tau^\phi\Pi} \right\}^{(1-\phi)/\phi} \quad (18)$$

where  $\tau$  is the solution from equation (22). The maximum rate of growth of consumption can then be calculated using equation (9). Here we can interpret  $\beta^{1/(1-\phi)}$  and  $\gamma^{1/(1-\phi)}$  as the measures of the individual productivity of spending by the central and local government, respectively. In the same light,  $\Pi = \beta^{1/(1-\phi)} + \gamma^{1/(1-\phi)}$  represents the aggregate productivity of both levels of government spending. From equations (16) and (17), it is not difficult to see that the growth-maximizing spending shares are equal to the ratios of individual productivity to the aggregate productivity. If the actual spending shares do not correspond to these growth-maximizing shares, some reallocation of resources among the two levels of government will be growth-enhancing.

This point can be made most clearly in the case of the Cobb-Douglas production function. With the Cobb-Douglas technology,  $\phi = 0$ . Then, the growth-maximizing tax rate given by equation (22) is very simple:

$$\tau^* = \beta + \gamma, \quad (19)$$

which is the same as the formula in Barro (1990) after the notation is made consistent.  $\Pi$  is simply equal to  $(\beta + \gamma)$ . Thus the growth-maximizing shares of the central and local government spending are also very simple:

$$\varphi_f^* = \frac{\beta}{\beta + \gamma} \quad (20)$$

$$\varphi_s^* = \frac{\gamma}{\beta + \gamma} \quad (21)$$

To test the impact on economic growth of spending by different levels of government, we use provincial panel data on China over the period of 1978 to 1992. But before our formal statistical analysis, we take a brief look at the data to see the patterns of revenue and expenditure allocations between the center and provinces and among provinces in China.

### **3 Trends of Intergovernmental Fiscal Allocations in China: 1978-1992**

Since the late 1970s, several rounds of fiscal reform have been conducted in China in an effort to decentralize the fiscal system and fiscal management (World Bank 1990; Wong et al 1993; Zhou and Yang 1992). Can we say that the resulting Chinese fiscal system is decentralized? The following examination of the Chinese central-local fiscal status suggests that the question should be answered very carefully.<sup>2</sup>

#### **3.1 Trend in overall fiscal status**

Following the public finance literature, we measure the overall fiscal status in China as the spending-to-GDP ratio of all governments, including the central and local governments.<sup>3</sup> Government spending is measured in three different ways: budgetary spending, extra-budgetary spending, and consolidated

---

<sup>2</sup>Local governments include all sub-national governments in this paper.

<sup>3</sup>The data used in our calculation is described in detail in the Data Appendix.

spending, which is the sum of budgetary and extra-budgetary spending. The time trends of government spending are shown in Figure 1.

The spending-to-GDP ratio in budgetary finance was 18.27 percent in 1992 compared to 30.77 percent in 1978. Although there were insignificant rises from 1978 to 1979, from 1985 to 1986, and from 1988 to 1989, the budgetary spending-to-GDP ratio declined continuously since the beginning of the reform in 1978. On the extra-budget side, changes in spending-to-GDP ratio were merely arithmetic, although the ratio rose from 14.17 percent in 1982 to 15.20 percent in 1992.<sup>4</sup> The consolidated budget exhibited an inverted U-shape with the measure of spending-to-GDP ratio first up during 1982-1986 and then down during 1986-1992, from 36.43 percent in 1982 to 40.35 percent in 1986, and to 33.47 percent in 1992.

The above results show that the overall fiscal status of consolidated government weakened during the reform period, especially for budgetary finance. This trend can also be confirmed by the measure of revenue-to-GDP ratio of consolidated government revenue, as shown in Figure 2.

### **3.2 Relative status of the central-local budget**

Fiscal decentralization is mainly measured by the relative size of the local budget with respect to the central budget. Despite China's unitary system, in which tax laws and tax policies are set by the central government and applied uniformly nationwide, there are no delineations of powers and

---

<sup>4</sup>The central and provincial-aggregated data of extra-budgetary spending became available in 1982.

responsibilities between the central and local governments in practice. In many respects, as pointed out in a World Bank study, “the Chinese system functions as a federalism” (World Bank 1990). Therefore, both central and local governments have contributed significantly to the allocation and utilization of public resources. On the spending side, the central government had a of 46.89 percent share of the total government budgetary spending in 1978. This share became 42.60 percent in 1992, indicating small progress in budgetary decentralization. But a closer examination reveals that the central spending share first kept rising until 1981 when it reached at 54.01 percent, then went down as far as 36.35 percent in 1989, and subsequently rose again to almost return to its original level. Although the total spending share of the central government rose and fell, the central budgetary spending share declined over most of the past decade, as shown in Figure 3.

### **3.3 Central-local enterprise relations**

Turning to extra-budgetary revenue and spending, we see quite a different picture. In China, government budgets include not only budgetary funds but also extra-budgetary funds (EBF), about 80 percent of which come from the income and profits generated by state-owned enterprises (SOEs) (World Bank 1990).<sup>5</sup> Given the nature of EBF, fiscal decentralization can be achieved if

---

<sup>5</sup>Extra-budgetary funds are created to supplement budgetary resources among governments, public agencies, and SOEs. They are usually managed and allocated with a certain amount of revenue assigned by the central government. Local governments can also create such assignments to their “owned” SOEs under the delegation of the central government. For details, see World Bank (1990), Shirk (1993), and Wong et al (1993).

the central government shifts public resources to local governments through assigning more SOEs to local governments. To measure fiscal decentralization this way, we use the central shares of extra-budgetary revenue (EBR) and of extra-budgetary spending (EBS). That is, a higher degree of decentralization is indicated by a smaller central share of the EBR (and/or EBS).

As shown in Figure 3 and Figure 4 respectively, the central shares in EBR and EBS showed similar movements over time. The central EBR share rose from 33.72 percent in 1982 to 41.57 percent in 1985, and again to 44.30 percent in 1992. The central EBS share also increased: from 30.91 percent in 1982 to 40.87 percent in 1985, and again, to 43.64 percent in 1992. Unlike central budgetary spending, figures in central EBR and EBS manifested a trend of fiscal decentralization over the post-reform period.

### 3.4 Fiscal decentralization in provincial perspective

We now further explore fiscal decentralization by looking into government spending in twenty-eight provinces.<sup>6</sup> In addition to the complications in the central-local (aggregate) fiscal relations described earlier, more variations can be found in fiscal decentralization on the basis of provincial comparisons.

First, there is significant cross-province heterogeneity in the degree of fiscal decentralization. The ratio of budgetary spending to provincial income on average (1980-1992) ranged from 8.96 percent in *Jiangsu* (a coastal province)

---

<sup>6</sup>Of the total thirty provincial areas in China (mainland), two provincial areas, *Tibet* and *Hainan*, are excluded due to their special status. For a complete list of the twenty-eight provincial areas used in this study, see the Data Appendix.

to 40.52 percent in *Ningxia* (an inland minority province), indicating a general tendency for provincial government to participate less in developed areas than in less developed areas. Further complications came from the three metropolitan cities, *Beijing*, *Tianjin*, and *Shanghai*, which held the highest ranks in per-capita income and above average levels of the ratio of budgetary spending to provincial income. Table 1 shows the provincial variations in provincial per-capita income and the size of provincial budget in the period 1980-1992.

In measures of fiscal decentralization, cross-province disparities are also evident. As shown in Table 2(a), 2(b), and 2(c), on average in the period of 1978-1992, the ratio of provincial budgetary spending to central budgetary spending ranged from 1.08 percent in *Ningxia* to 8.91 percent in *Guangdong* (a leading province in economic reform). For extra-budgetary funds, the ratio of provincial consolidated budgetary spending to central consolidated budgetary spending varied from 0.91 percent in *Ningxia* to 10.28 percent in *Liaoning*, one of China's heavy industrial centers. Measured by the ratio of per-capita provincial budgetary spending to per capita central budgetary spending, fiscal decentralization was as low as 70.57 percent in *Guizhou* (a mountainous minority province) and as high as 436.18 percent in *Beijing* (the nation's capital).

Second, the intertemporal picture in fiscal decentralization is also diversified among provinces. *Guangdong*, a coastal province favored by central government policies and among the first to start economic reforms in 1978, experienced the greatest increase in fiscal decentralization. Measured by the ratio of provincial budgetary spending to central budgetary spending, there

was a 112.97 percent increase in *Guangdong* from 1978 to 1992.<sup>7</sup> At the other extreme, *Qinghai*, one of the eight minority provincial areas, hardly saw any changes in fiscal decentralization, with its provincial-to-central budgetary ratio narrowing from 1.31 percent in 1978 to 1.20 percent in 1991, and to 0.99 percent in 1992. Between *Guangdong* and *Qinghai* stand mostly inland provincial areas. *Sichuan*, the most populous province in China, started with its provincial-to-central spending share at 6.86 percent in 1978 (higher than *Guangdong*'s 5.51 percent in 1978) and ended with only 8.54 percent in 1992 (lower than *Guangdong*'s 11.73 percent in 1992). *Henan*, a long-time center of ancient China, also saw changes in a much narrowed range, from 6.47 percent in 1978 down to 5.56 percent in 1992 in its provincial-to-central budgetary spending ratio. Comparisons of fiscal decentralization in these four provinces are presented in Figure 5.

### 3.5 Summary

The above discussion suggests that fiscal reform in China does not yield a clear pattern of decentralization. (1) Budgetary spending became more decentralized since 1978. (2) Extra-budgetary spending, however, showed an increasing central share through the entire reform period. (3) The consolidated (budgetary and extra-budgetary) central spending share fluctuated, starting with 42.09 percent in 1982, 43.44 percent in 1985, 37.54 percent in 1987, and ending at 43.09 percent in 1992. (4) On the revenue side, man-

---

<sup>7</sup>Due to data availability, intertemporal comparisons of provincial fiscal decentralization employ only the ratio of provincial budgetary spending to central budgetary spending.



agement and collection became even more centralized. Combining budgetary and extra-budgetary funds, the central revenue share increased from 27.57 percent in 1982 to 41.92 percent in 1992, indicating a strengthened central control in governmental revenue. (5) Fiscal decentralization was found to be highly divergent across provinces and over time. In the following section, we will quantify the impact of various decentralization measures on provincial economic growth.

## 4 Empirical Estimations with Provincial-Level Data

### 4.1 Variables and estimation equation

Our empirical estimations are based on the annual data over the period from 1980 to 1992 for 28 provinces. The dependent variable is the provincial income growth rate in real terms.<sup>8</sup> The explanatory variables fall into three categories: (1) production inputs; (2) measures of fiscal decentralization; and (3) others, such as tax rates, foreign trade, and inflation rates.

We use the following data in our estimations:

Y = real growth rate of provincial income, measured in the percentage change;

L = growth rate of the provincial labor force, measured by the percentage change in the total number of the labor force;

---

<sup>8</sup>Provincial income is defined as provincial equivalent of national income (*Guomin Shouru*), which measures net provincial output according Chinese statistics.

I = provincial investment rate, measured by the ratio of investment (accumulation in fixed asset and circulating funds) to provincial income;

F = degree of openness of provincial economy, measured by the share of total volume of foreign trade (exports and imports) in provincial income;

T = degree of distortion in provincial economy, measured by the ratio of provincial revenue collection to provincial income;

R = inflation rate, measured by the overall social retail price index in each province;

DC = degree of fiscal decentralization, measured by the following six different indicators:

$DC_{cse1}$  = the ratio of total provincial spending to total central spending;

$DC_{cse2}$  = the ratio of per-capita provincial spending to per-capita central spending;<sup>9</sup>

$DC_{be1}$  = the ratio of provincial budgetary spending to central budgetary spending;

$DC_{be2}$  = the ratio of per-capita provincial budgetary spending to per-capita central budgetary spending;

$DC_{ebe1}$  = the ratio of provincial extra-budgetary spending to central extra-budgetary spending;

$DC_{ebe2}$  = the ratio of [provincial extra-budgetary spending/provincial income] to [central extra-budgetary spending/national income];

---

<sup>9</sup>The central per capita spending is the central spending divided by the total population of China.

To these provincial-level data we fit our growth model as follows:

$$Y_{st} = \beta_m M_{st} + \beta_n N_{st} + \beta_{dc} DC_{st} + \sum_{s=1}^{28} \alpha_s D_s + u_{st} \quad (22)$$

where  $s$  and  $t$  indicate province and year, respectively,  $M_{st}$  is a set of variables always included in the regression,  $DC_{st}$  denotes variables of interest,  $N_{st}$  is a subset of variables identified by the literature as potentially important explanatory variables of growth,  $D_s$  denotes provincial dummy variable, and finally,  $u_{st}$  denotes error term. Numbers of variables included in the M- and N-sets are denoted by  $m$  and  $n$  respectively.

The M-variables consist of the growth rate in the total labor force (L) and the tax rate (T). The labor growth rate is not explicitly considered in our theoretical model for analytical simplicity. The tax variable is our aggregate measure of distortion introduced by governments to finance their spending. Other variables identified as potentially important explanatory variables of growth in many studies on economic growth are included as the N-variables. They are degree of openness (F), the inflation rate (R), and finally, the investment rate (I). The usual argument for including the degree of openness as a determinant of growth states that more exports lead to more efficient resource allocation as a result of external competition in the world market and more imports are the means to import advanced technology from developed economies (see, Feder 1983). Inflation can generate a positive effect on growth because higher inflation leads people to invest more in physical capital and cut their real-balance holdings (the Tobin portfolio shift effect), but at the same time, inflation raises the transaction cost of economic activities (consumption and investment) and may reduce the rate of economic growth.

The investment rate appears as a “must-include” variable in conventional specifications of growth estimation. But in our analysis, it is endogenous. In order to make sure that our results are robust across different specifications of regression equations, we also include the investment rate as one explanatory variable in our sensitivity analysis. From our theoretical model in equation (12), our central concern is the third set of variables  $DC_{st}$  in (22): the six different indicators of fiscal decentralization.

## 4.2 Regression results

### 4.2.1 Base case

As our base case, we first choose the M-variables and one of the six indicators of fiscal decentralization,  $DC_{be2}$ , the ratio of per-capita provincial spending to per-capita central spending, while ignoring the potentially important N-variables. The LSDV (Least Squares Dummy Variables) regression results over the 1986-1992 period are :

$$Y_{st} = 0.274L_{st} \quad -0.407T_{st} \quad -0.05DC_{be2st}$$

$$(0.878) \quad (-2.628) \quad (-3.541)$$

(Adjusted  $R^2 = 0.328$ , number of observation = 196; values of t-statistics appear in parentheses). The M-variables have signs as predicted by our model but are not significantly different from zero at the 5 percent significance level. Our primary concern is the sign and magnitude of the coefficient for decentralization, which is -0.05 and is significantly different from zero at the 5 percent significance level. The regression result implies that fiscal

decentralization in China did not promote provincial economic growth, indicating an inappropriate level of decentralization or too much decentralization in government budgetary spending.

To see whether this conclusion is robust to changes in the conditioning information set, we conducted sensitivity tests against the base equation.

Table 3 presents the sensitivity results for each of the M-variables and the indicators of fiscal decentralization. Eight estimations are conducted along with different selections of the three N-variables. The labor coefficients are positive but not significantly different from zero at the 5 percent confidence level, and the non-significance result is consistent between the lower bound and the upper bound of the labor coefficient. Similar results are observed with the coefficients of the tax rates. Our major variable of interest is fiscal decentralization,  $DC_{be2}$ . The decentralization coefficient is negative and robust.<sup>10</sup> At the upper bound, the decentralization coefficient is -0.047 with the t-statistic of -3.67, while it becomes -0.069 with the t-statistic of -4.821 at the lower bound. This result implies that economic growth falls by as little as 4.7 percent and by as much as 6.9 percent for each additional unit of decentralization measured by  $DC_{be2}$ , the ratio of per-capita provincial budgetary spending to per-capita central budgetary spending.

#### 4.2.2 Structural changes

To further investigate our result of a negative effect of fiscal decentralization on Chinese provincial economic growth, structural changes are introduced in

---

<sup>10</sup>Following Levine and Renelt (1992), we say the result is robust if the regression coefficient remains significant and of the same sign at the extreme (lower and upper) bounds.

the following two ways with respect to the base case: (1) different sample periods, (2) different selections of decentralization indicators, and (3) cross-province estimations based on provincial average values in the period 1986-1992.

Table 4 contains results of structure changes introduced in the base case. First, the negative correlation between fiscal decentralization and growth maintains for all the three sample periods: 1986-1992, 1980-1992, and 1985-1989. The first sample period is our base sample period for which we have consistent data from the State Bureau of Statistics (SBS). The second one extends the base sample period to the beginning of reforms and contains data from provincial bureaus of statistics in addition to those from SBS. The third sample is selected to specify the period during which extensive fiscal decentralization was observed. As shown in Columns (1) - (3), the decentralization coefficients are consistently negative and significantly different from zero at the 5 percent level of confidence. The magnitude of the negative effect of decentralization on growth, however, changes across different samples: in the sample covering the entire reform period, the negative effect of decentralization on growth appears weaker than in the base case, while in the sample of extensive decentralization, the negative effect becomes stronger.

Second, structural changes are also introduced by testing the growth effect of four other indicators of decentralization. Instead of measuring decentralization only with budgetary spending, we select  $DC_{cse2}$ , measuring decentralization with per-capita total (budgetary and extra-budgetary) government spending, to conduct our estimation. The result is shown in Column (5). Following international conventions, we also choose  $DC_{cse1}$ , the ratio

of total provincial spending to total central spending, as the decentralization measure and the result is shown in Column (1). We further test the growth effect of decentralization by dividing total spending into budgetary and extra-budgetary spending. Column (6) shows the results with decentralization measures in both budgetary and extra-budgetary spending. Column (7) contains the results for the same regression when budgetary spending and extra-budgetary spending are adjusted by provincial population and income size, respectively. The negative and significant effect of fiscal decentralization on growth is observed across all these different decentralization indicators. If the ratio of total provincial spending to total central spending rises by 1 percent, provincial economic growth will fall by 3.12 percent; if the ratio of provincial budgetary spending to central budgetary spending rises by 1 percent, the provincial growth rate will be lowered by 2.15 percent; for extra-budgetary spending, a rise in the relative provincial share by 1 percent will reduce the growth rate by 0.96 percent.

To introduce the second structural change with respect to the base case, we estimate the base equation and the augmented base equation ( including all the M- and N-variables) with average provincial data over the period 1986-1992. Estimation of the base equation based on provincial average values is shown in Column (8): the growth impact of decentralization is still negative, but not significant. Estimation of the augmented base equation is reported in Column (9), labeled as the non-base equation, which presents a negative and significant coefficient for fiscal decentralization. In this column, we also note that the inflation rate has a positive and nonsignificant effect on growth, the effect of provincial openness is positive and statistically very significant, and

the rate of investment has the conventional sign (positive), and is significant.

### 4.2.3 Alternative specifications and their sensitivities

Following the results of negative and significant signs of coefficients on various indicators of fiscal decentralization, we now further pursue the robustness of the results. To do so, sensitivity analyses are conducted with respect to each selection of four additional decentralization indicators introduced earlier. The robustness is then further examined with random-effect estimations, as shown in Table 5.

Similar to Table 3, sensitivity tests are conducted against all the decentralization indicators where the M-variables are labor (L) and the tax rate (T) and the N-variables include openness (F), inflation (R), and investment (I). Eight regressions are estimated along with different selections of the three N-variables. The results are quite robust: the negative association between decentralization and growth prevails among the 32 estimations, although the result of negative significance for  $DC_{be2}$  appears relatively weak in two estimations at the 5 percent significance level. Moreover, the coefficients on the measure of openness and on the investment rate are positive and significant in most of those estimations, some of which are included in Table 6.

Table 7 shows the results of random-effect estimates with the generalized least square (GLS) regression, which follows the specification used in the base case. Negative and significant coefficients on fiscal decentralization are found for three indicators as shown in Column (1) - (3). Column (4) gives a negative sign for  $DC_{cb2}$ , but it is not significant. The coefficient for  $DC_{be2}$ , the



indicator with respect to budgetary funds adjusted by provincial population, turns out to be positive but insignificant, as shown in Column (5). However, overall results from the random-effect estimations show their consistency with those in our previous (fixed-effect) estimations.

## 5 Conclusions

The negative effect of fiscal decentralization on provincial economic growth has been found to be consistently significant and robust in China. It suggests that fiscal reforms began in China since the early 1980s seem to have failed to promote the country's economic growth. This finding is surprising in light of the conventional wisdom that fiscal decentralization usually makes a positive contribution to provincial or local economic growth. The result seems to suggest that provincial spending has failed to deliver fast economic growth as widely expected. Perhaps this is understandable because, in the current stage of the Chinese economic development, the central government is constantly constrained by the limited resources for public investment in national priorities and nation-wide externalities such as highways, railways, power stations, telecommunications, and energy. These key projects may have far more significant impact on growth across provinces than their counterparts in each province.

This finding also has some implications for those developing countries and transitional economies pursuing fiscal decentralization. The merits of fiscal decentralization have to be measured relative to existing revenue and expenditure assignments and to the stage of economic development. In the

early stage of economic development, the central government may be in a much better position to undertake public investment with nation-wide externalities. More importantly, if local shares in total fiscal revenue and expenditure are already high, further decentralization may result in slower economic growth. In this connection, the dangers of decentralization put forward by Prud'homme (1995) seem to be empirically relevant.

Our empirical assessment of China is still quite preliminary. For future research, we need to consider the composition of central and local government spending and identify the contribution of public spending to provincial growth by both functional forms and levels of government when the data become available. Furthermore, the role of intergovernmental transfers should be considered explicitly in the process of fiscal decentralization. While some analytical work has been done in this respect (Zou 1994, 1995), the collection of provincial data on both conditional and non-conditional grants from the center to localities in China should be a priority. Finally, instead of measuring distortions by a simple output tax, we should pay more attention to the revenue side of fiscal decentralization and quantify the impacts of local taxes and central taxes on economic growth.

## Data Appendix

Our empirical estimations are based on annual data for 28 provinces. Data sources are all official publications in China. Although over 100 volumes of statistical publications are involved, major data sources include China Statistical Yearbook and provincial statistical yearbooks for various years.<sup>11</sup> Variables used for estimations are listed below with their data sources. Names of provincial areas included in our estimations are also listed.

**Y** = real growth rate of provincial income, measured by the percentage rate

Derived from index of provincial income measured at constant price level (Sources: for 1980-1985: China National Income Statistics 1949-1985 (*Guomin Shouru Tongji Ziliao Huibian* 1949-1985); for 1985-1992: China Statistical Yearbook (*Zhongguo Tongji Nianjian*), various issues

**L**= growth rate of the provincial labor force, measured by the percentage change in the total number of the labor force

Derived from the total number of the labor force in the whole society (Sources: for 1980-1985, various volumes of provincial statistical yearbooks; for 1986-1992: China Statistical Yearbook (*Zhongguo Tongji Nianjian*), various issues

**I** = provincial investment rate, measured by the rate of accumulation in fixed asset and circulating funds

---

<sup>11</sup>Provincial statistical yearbooks cover 28 provinces for various years up to 1994.

Derived from index of total accumulations in provincial income measured at constant price level (Sources: for 1980-1985: China National Income Statistics 1949-1985 (*Guomin Shouru Tongji Ziliao Huibian* 1949-1985); for 1985-1992: China Statistical Yearbook (*Zhongguo Tongji Nianjian*), various issues)

**F** = degree of openness of provincial economy, measured by the share of total volume of foreign trade (exports and imports) in provincial income

Derived from the total volume of provincial exports and imports (divided by provincial income) (Sources: Almanac of China's Foreign Economic Relations and Trade (*Zhongguo Duiwai Jingji Maoyi Nianjian*), various issues in 1984-1994/95.)

**T** = degree of distortion in provincial economy, measured by the ratio of provincial revenue collection in provincial income

Derived from provincial budgetary revenue collection (divided by provincial income) (Sources: various volumes of provincial statistical yearbooks)

**R** = inflation rate, measured by the overall social retail price index in each province (Sources: China Statistical Yearbook (*Zhongguo Tongji Nianjian*), various issues)

**DC<sub>cse1</sub>** = decentralization measured by the ratio of total provincial spending to total central spending

Total (central or provincial ) spending is the sum of budgetary spending and extra-budgetary spending (Sources: see sources of budgetary spending and of extra-budgetary spending)

**DC<sub>cse2</sub>** = decentralization measured by the ratio of per-capita provincial spending to per-capita central spending

Per-capita (central or provincial) spending is derived from spending divided by population. (Sources: for provincial population: various volumes of provincial statistical yearbooks; for the central government, national population is used, China Statistical Yearbook (*Zhongguo Tongji Nianjian*), various issues)

$DC_{be1}$  = decentralization measured by the ratio of provincial budgetary spending to central budgetary spending (Sources: for province: various volumes of provincial statistical yearbooks; for the central government: China Statistical Yearbook (*Zhongguo Tongji Nianjian*), various issues)

$DC_{be2}$  = decentralization measured by the ratio of per-capita provincial budgetary spending to per-capita central budgetary spending (Sources: see sources of budgetary spending and of population)

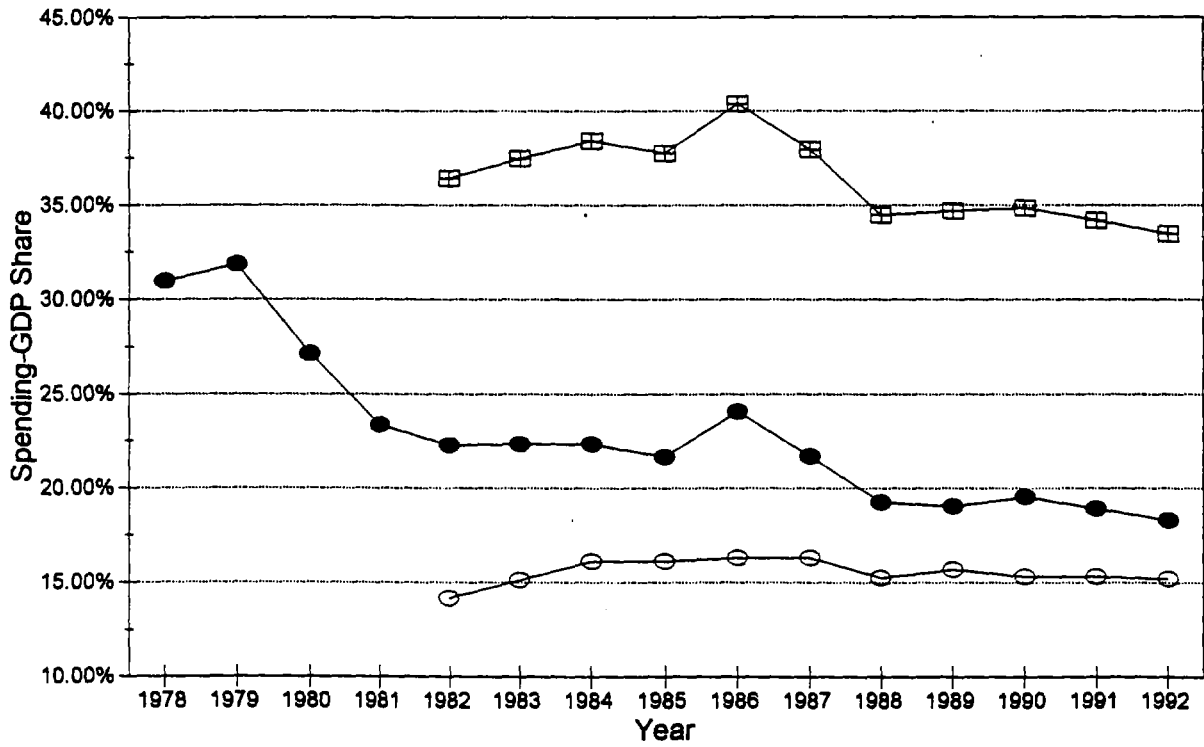
$DC_{ebe1}$  = decentralization measured by the ratio of provincial extra-budgetary spending to central extra-budgetary spending (Sources: China Government Finance Statistics (*Zhongguo Caizheng Tongji*, 1950-1991), Yearbook of China Government Finance (*Zhongguo Caizheng Nianjian*, 1993)

$DC_{ebe2}$  = decentralization measured by the ratio of [provincial extra-budgetary spending/provincial income] to [central extra-budgetary spending/national income] (Sources: see sources of provincial income and of extra-budgetary spending)

List of provincial areas:

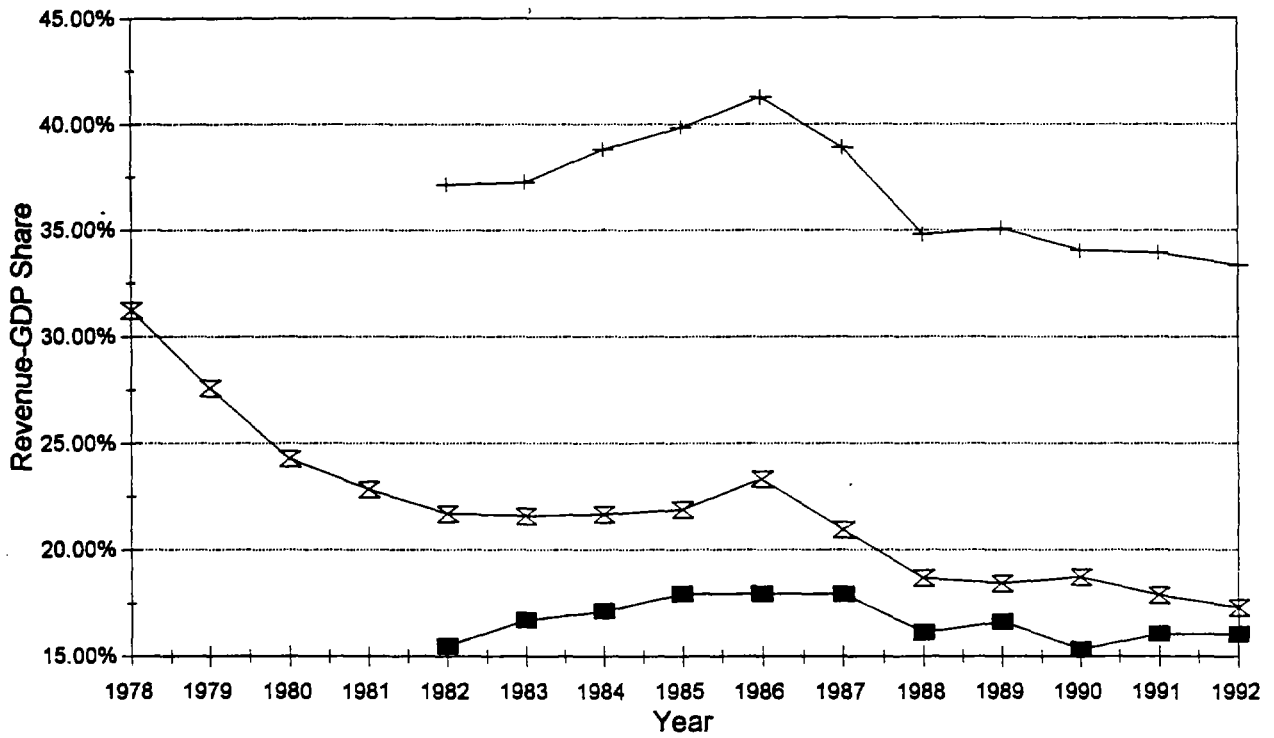
*Beijing, Tianjin, Hebei, Shanxi, Neimenggu (Inner Mongolia), Liaoning, Jilin, Heilongjiang, Shanghai, Jiangsu, Zhejiang, Anhui, Fujian, Jiangxi, Shandong, Henan, Hubei, Hunan, Guangdong, Guangxi, Sichuan, Guizhou, Yunnan, Shaanxi, Gansu, Qinghai, Ningxia, and Xinjiang.*

**Figure1: Government Spending Share**  
1978-1992



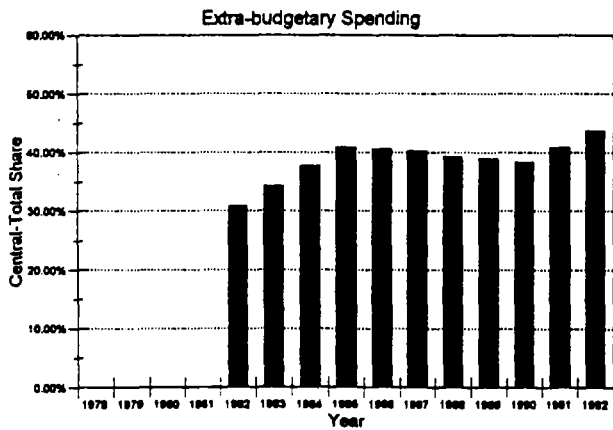
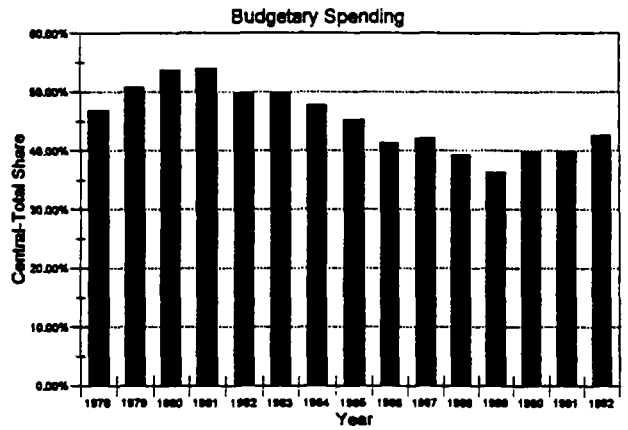
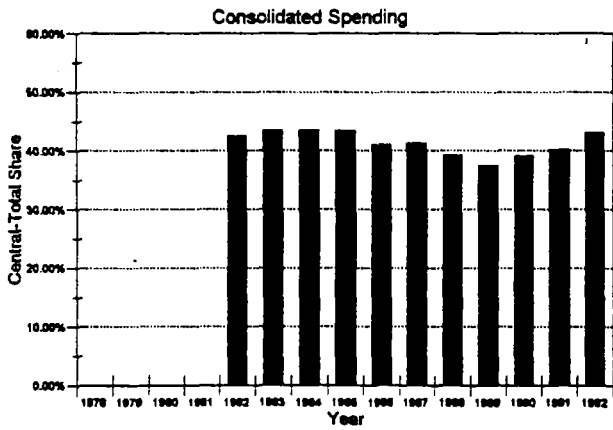
—□— Consolidated Spending    —●— Budgetary Spending    —○— Extra-budgetary Spending

**Figure 2: Government Revenue Share**  
1978-1992

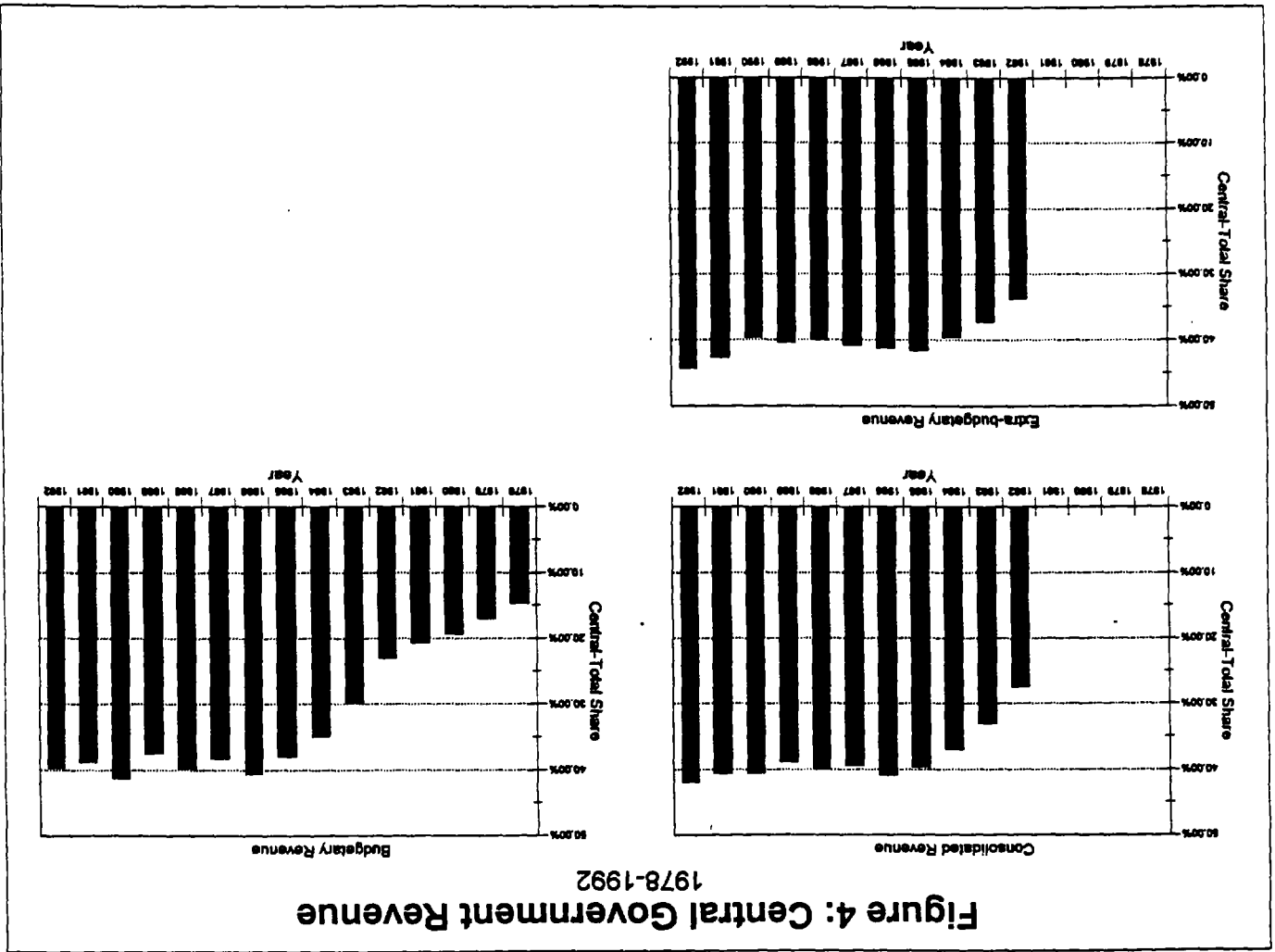


—+— Consolidated Revenue    —x— Budgetary Revenue    —■— Extra-budgetary Revenue

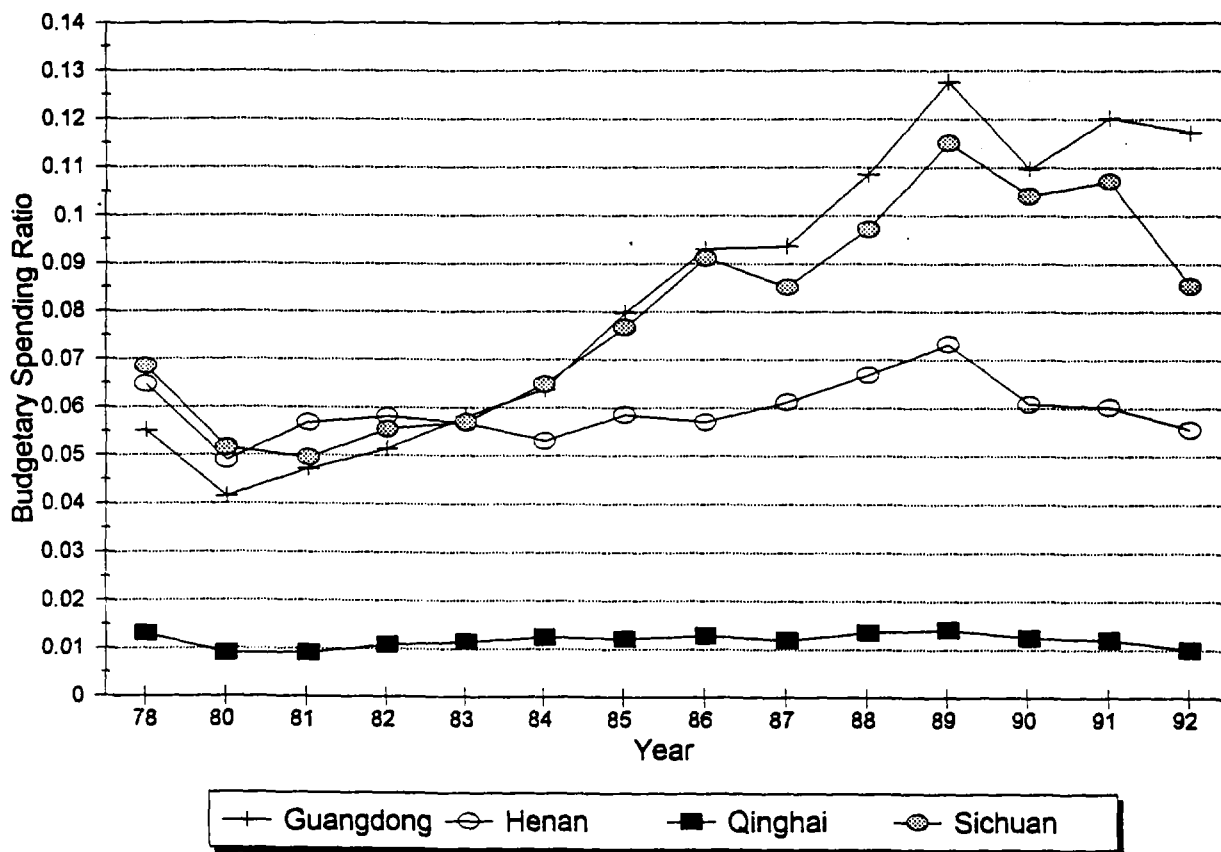
**Figure 3: Central Government Spending**  
1978-1992







**Figure 5: Fiscal Decentralization**  
 (Selected Provinces: 1978-1992)



**Table 1: Size of Provincial Budget and Income**

Provincial Areas	Size of Budgetary Spending /I			Per capita Income		
	Average (1980-1992)	Initial Level (1980)	Current Level (1992)	Average (1980-1992)	Initial Level (1980)	Current Level (1992)
<b>Three Metropolitan Cities</b>	14.57%	12.01%	15.15%	28.23%	16.51%	42.16%
Beijing	17.06%	13.47%	16.72%	24.67%	12.46%	39.12%
Tianjin	17.09%	15.76%	16.37%	21.89%	12.43%	33.23%
Shanghai	10.23%	6.79%	12.35%	38.14%	24.63%	54.14%
<b>Costal Areas</b>	11.71%	13.17%	11.67%	10.60%	3.82%	18.32%
Jiangsu	8.96%	10.69%	8.72%	11.70%	4.56%	18.53%
Zhejiang	10.64%	10.95%	9.84%	11.72%	4.14%	20.09%
Fujian	17.25%	20.65%	16.99%	8.49%	2.89%	15.13%
Shandong	10.24%	11.93%	9.60%	9.30%	3.46%	16.13%
Guangdong	13.37%	11.62%	13.22%	13.09%	4.03%	21.74%
<b>Inland Areas</b>	15.04%	16.47%	15.66%	7.98%	3.72%	12.54%
Hebei	13.01%	12.67%	11.50%	7.85%	3.64%	12.74%
Shanxi	20.34%	23.08%	18.17%	7.38%	3.43%	11.35%
Liaoning	13.76%	13.66%	17.42%	14.29%	7.16%	22.08%
Jilin	20.16%	20.36%	22.14%	9.34%	3.85%	14.53%
Heilongjiang	15.93%	13.74%	17.82%	11.10%	5.85%	17.59%
Anhui	12.59%	13.03%	15.75%	6.26%	2.61%	8.82%
Jiangxi	15.93%	16.16%	15.45%	6.20%	3.03%	10.11%
Henan	13.71%	16.42%	10.93%	5.95%	2.66%	9.54%
Hubei	13.45%	15.26%	14.09%	8.48%	3.71%	12.97%
Hunan	14.25%	17.88%	12.36%	6.69%	3.16%	10.56%
Sichuan	13.55%	12.63%	15.28%	6.00%	2.70%	9.78%
Shanxi	19.51%	22.74%	16.96%	6.20%	2.84%	10.38%
<b>Minority Areas</b>	28.13%	28.16%	24.58%	6.52%	2.87%	10.95%
Neimeng	29.65%	34.83%	25.30%	7.20%	2.81%	12.06%
Guangxi	13.93%	15.01%	14.70%	5.33%	2.32%	8.86%
Guizhou	14.52%	12.81%	19.05%	4.51%	1.90%	7.36%
Yunnan	25.92%	23.12%	29.03%	5.70%	2.38%	10.09%
Gansu	22.70%	20.27%	22.72%	6.25%	3.16%	10.00%
Qinghai	40.46%	42.28%	34.48%	7.41%	3.69%	11.63%
Ningxia	40.52%	48.80%	30.58%	6.77%	3.15%	11.07%
Xinjiang	25.74%	31.33%	20.81%	8.96%	3.59%	16.52%
Minimum	8.96%	6.79%	6.72%	4.51%	1.90%	7.36%
Maxmum	40.52%	48.80%	34.48%	38.14%	24.63%	54.14%
Standard Deviation	0.08	0.09	0.06	0.07	0.04	0.10

Note: (1) Measured by the ratio of provincial budgetary spending to provincial income  
(2) Initial year for Xinjiang is 1985

Sources: See Data Appendix

**Table 2 (a) Descriptive Statistics of Provincial Decentralization in Budgetary Finance (1)**

Provincial Areas	Average (1978-1992)	Minimum (1978-1992)	Maximum (1978-1992)	Standard Deviation (1978-1992)	Initial Level (1978)	Current Level (1992)	Growth Rate (1978-1992)
<b>Three Metropolitan Cities</b>	3.94%	2.50%	5.19%	0.0078	3.90%	3.80%	-2.57%
Beijing	3.93%	2.29%	5.38%	0.0095	3.91%	3.83%	-2.01%
Tianjin	3.01%	2.25%	3.72%	0.0045	2.79%	2.49%	-10.89%
Shanghai	4.88%	2.95%	6.63%	0.0116	4.99%	5.07%	1.64%
<b>Costal Areas</b>	6.21%	3.76%	8.96%	0.0162	5.29%	7.30%	57.15%
Jiangsu	6.05%	3.95%	8.13%	0.0127	5.45%	6.72%	23.43%
Liaoning	7.16%	4.43%	10.34%	0.0186	6.01%	7.93%	32.04%
Zhejiang	4.53%	2.66%	6.77%	0.0124	3.35%	5.09%	52.19%
Fujian (2)	3.79%	2.31%	5.47%	0.0106	2.31%	4.51%	95.17%
Shandong	6.83%	4.24%	10.29%	0.0183	6.12%	7.78%	27.10%
Guangdong	8.91%	4.16%	12.77%	0.0292	5.51%	11.73%	112.97%
<b>Inland Areas</b>	4.96%	3.62%	6.50%	0.0092	4.91%	4.91%	2.06%
Hebei	5.60%	3.67%	6.99%	0.0088	6.23%	5.41%	-13.18%
Shanxi	3.67%	2.90%	4.60%	0.0046	4.05%	3.43%	-15.25%
Jilin	4.19%	2.64%	6.07%	0.0119	3.14%	4.27%	36.21%
Heilongjiang	5.80%	3.96%	7.72%	0.0112	6.05%	5.47%	-9.59%
Anhui	3.90%	2.56%	5.26%	0.0082	3.48%	3.96%	13.73%
Jiangxi	3.36%	2.33%	4.41%	0.0062	3.12%	3.65%	16.98%
Henan	5.95%	4.90%	7.33%	0.0058	6.47%	5.56%	-14.16%
Hubei	5.41%	3.92%	7.15%	0.01	5.75%	5.29%	-8.12%
Hunan	5.09%	4.45%	6.23%	0.0044	5.37%	4.96%	-7.71%
Sichuan	7.92%	4.96%	11.51%	0.0211	6.86%	8.54%	24.55%
Shaanxi	3.48%	2.72%	4.60%	0.0053	3.52%	3.49%	-0.85%
<b>Minority Areas</b>	2.77%	1.72%	3.67%	0.006	2.32%	2.98%	20.72%
Inner Mongolia	4.02%	2.72%	5.05%	0.0067	3.59%	3.85%	7.33%
Guangxi	2.73%	1.82%	3.75%	0.0066	2.75%	3.27%	18.91%
Guizhou	1.92%	1.03%	3.01%	0.0066	1.20%	2.53%	110.35%
Yunnan	4.89%	2.81%	7.41%	0.016	3.51%	6.50%	85.08%
Gansu	2.84%	1.86%	3.73%	0.0055	2.75%	2.86%	3.77%
Qinghai	1.18%	0.90%	1.42%	0.0015	1.31%	0.96%	-23.80%
Ningxia	1.08%	0.77%	1.28%	0.0015	1.11%	0.85%	-23.55%
Xinjiang (2)	3.47%	3.00%	3.80%	0.0024	3.42%	3.00%	-12.36%
<b>Minimum</b>	1.06%			0.0015	1.11%	0.85%	-23.80%
<b>Maximum</b>	8.91%			0.0292	6.86%	11.73%	112.97%
<b>Standard Deviation</b>	0.0181				0.0162	0.0224	0.1959

Note: (1) Fiscal Decentralization is measured by the ratio of provincial budgetary spending to central budgetary spending

(2) Initial year are 1980 and 1985 for Fujian and for Xinjiang respectively.

Source: See Data Appendix

**Table 2 (b) Descriptive Statistics of Provincial Decentralization in Consolidated Finance (1)**

Provincial Areas	Average (1986-1992)	Minimum (1986-1992)	Maximum (1986-1992)	Standard Deviation (1986-1992)	Initial Level (1986)	Current Level (1992)	Growth Rate (1986-1992)
<b>Three Metropolitan Cities</b>	5.63%	4.27%	6.23%	0.0082	5.92%	4.27%	-27.76%
Beijing	5.81%	5.13%	6.22%	0.0035	5.67%	5.13%	-9.56%
Tianjin	3.56%	2.69%	4.18%	0.0048	4.18%	2.69%	-35.71%
Shanghai	7.54%	5.00%	8.63%	0.0112	7.90%	5.00%	-36.67%
<b>Costal Areas</b>	7.92%	7.02%	8.89%	0.0057	7.02%	7.43%	5.82%
Jiangsu	8.45%	7.90%	9.35%	0.0048	8.08%	7.90%	-1.91%
Liaoning	10.26%	8.56%	11.59%	0.0109	9.00%	8.56%	-4.93%
Zhejiang	6.11%	5.45%	6.82%	0.0047	5.45%	5.86%	8.12%
Fujian	4.16%	3.55%	4.77%	0.0044	3.55%	4.08%	15.10%
Shandong	8.63%	7.41%	10.12%	0.0089	7.41%	7.66%	6.12%
Guangdong	9.91%	8.66%	10.87%	0.008	8.66%	10.26%	18.71%
<b>Inland Areas</b>	5.40%	4.78%	6.06%	0.0043	5.37%	4.78%	-10.85%
Hebei	6.35%	5.63%	7.23%	0.0058	5.85%	5.75%	-1.85%
Shanxi	4.16%	3.54%	4.63%	0.0032	4.26%	3.54%	-17.28%
Jilin	5.27%	4.30%	5.89%	0.0047	5.28%	4.30%	-18.21%
Heilongjiang	6.30%	5.15%	6.96%	0.0052	6.52%	5.15%	-20.96%
Anhui	4.40%	3.87%	4.72%	0.0028	4.52%	3.87%	-14.42%
Jiangxi	3.63%	3.36%	3.95%	0.0017	3.56%	3.36%	-5.73%
Henan	5.75%	5.26%	6.38%	0.0037	5.26%	5.26%	0.18%
Hubei	5.91%	4.99%	6.47%	0.0044	5.95%	4.99%	-16.13%
Hunan	5.30%	4.89%	5.91%	0.0029	5.16%	4.89%	-5.62%
Sichuan	9.46%	8.17%	10.79%	0.0079	9.16%	8.17%	-10.82%
Shaanxi	3.69%	3.31%	4.15%	0.0027	3.45%	3.31%	-4.19%
<b>Minority Areas</b>	2.79%	2.59%	3.05%	0.0017	2.61%	2.61%	-0.07%
Inner Mongolia	4.00%	3.51%	4.36%	0.0025	4.01%	3.51%	-12.53%
Guangxi	3.50%	2.92%	3.86%	0.0033	2.92%	3.72%	27.30%
Guizhou	2.14%	1.81%	2.39%	0.002	1.81%	2.06%	15.27%
Yunnan	5.16%	4.34%	5.89%	0.0056	4.34%	5.16%	18.94%
Gansu	2.80%	2.43%	3.03%	0.0018	2.84%	2.43%	-14.32%
Qinghai	1.02%	0.81%	1.12%	0.001	1.07%	0.81%	-24.22%
Ningxia	0.91%	0.72%	0.99%	0.0009	0.99%	0.72%	-27.93%
Xinjiang	2.74%	2.42%	2.86%	0.0015	2.66%	2.42%	-16.13%
<b>Minimum</b>	0.91%			0.0009	0.99%	0.72%	-36.67%
<b>Maximum</b>	10.26%			0.0112	9.16%	10.26%	27.30%
<b>Standard Deviation</b>	0.0242				0.0219	0.0223	0.1554

Note: (1) Fiscal Decentralization is measured by the ratio of provincial consolidated spending to central consolidated spending

Source: See Data Appendix

Table 2 (c) Descriptive Statistics of Provincial Decentralization in Consolidated Finance (1)

Provincial Areas	Average (1980-1992)	Minimum (1980-1992)	Maximum (1980-1992)	Standard Deviation (1980-1992)	Initial Level (1980)	Current Level (1992)	Growth Rate (1980 - 1992)
<b>Three Metropolitan Cities</b>	420.83%	268.52%	549.88%	0.8398	268.52%	407.41%	51.73%
Beijing	438.18%	254.89%	594.24%	1.088	254.89%	429.70%	68.75%
Tianjin	398.84%	297.11%	487.71%	0.805	297.11%	331.31%	11.51%
Shanghai	427.48%	253.76%	585.68%	1.094	253.76%	461.15%	81.73%
<b>Costal Areas</b>	140.43%	82.98%	202.70%	0.3814	85.87%	163.25%	90.12%
Jiangsu	103.64%	65.78%	140.22%	0.232	73.95%	113.99%	54.14%
Liaoning	209.58%	125.52%	300.72%	0.5741	148.34%	234.85%	58.32%
Zhejiang	122.85%	68.74%	181.18%	0.3479	68.74%	139.20%	102.51%
Fujian	146.95%	90.68%	213.47%	0.4029	90.68%	172.48%	90.21%
Shandong	84.20%	57.38%	141.89%	0.2611	62.52%	108.29%	70.00%
Guangdong	185.54%	70.98%	238.92%	0.5309	70.98%	212.69%	199.72%
<b>Inland Areas</b>	120.01%	85.88%	158.09%	0.2446	85.88%	118.42%	37.91%
Hebei	108.03%	70.04%	134.04%	0.169	70.04%	100.94%	44.11%
Shanxi	152.55%	115.89%	181.77%	0.1854	120.11%	135.07%	12.45%
Jilin	198.27%	118.21%	285.83%	0.586	118.84%	202.46%	70.36%
Heilongjiang	188.17%	121.98%	252.87%	0.4117	121.98%	181.88%	49.13%
Anhui	80.21%	51.65%	105.99%	0.1752	51.66%	79.75%	54.38%
Jiangxi	101.78%	70.56%	132.83%	0.1891	74.18%	109.39%	47.50%
Henan	79.10%	68.34%	97.24%	0.074	68.34%	73.49%	10.78%
Hubei	114.99%	82.73%	154.35%	0.2279	85.91%	112.36%	30.79%
Hunan	95.15%	63.45%	116.77%	0.0844	85.77%	93.55%	9.08%
Sichuan	83.49%	50.02%	121.21%	0.2388	51.76%	91.44%	76.64%
Shaanxi	122.32%	95.07%	161.95%	0.198	97.95%	122.30%	24.86%
<b>Minority Areas</b>	187.39%	122.27%	233.73%	0.3275	126.92%	178.02%	38.68%
Inner Mongolia	213.81%	142.79%	268.19%	0.3697	148.51%	204.45%	37.67%
Guangxi	74.44%	50.00%	101.76%	0.1721	52.73%	87.88%	68.65%
Guizhou	70.57%	38.84%	106.99%	0.2312	38.84%	90.05%	144.45%
Yunnan	154.04%	81.13%	228.91%	0.4931	82.79%	198.64%	139.92%
Gansu	147.20%	95.83%	193.83%	0.2988	97.29%	148.30%	50.37%
Qinghai	300.87%	238.81%	382.94%	0.3686	238.81%	252.81%	6.75%
Ningxia	271.91%	199.84%	316.50%	0.3895	233.49%	205.90%	-11.82%
Xinjiang (2)	268.71%	222.13%	294.64%	0.212	285.91%	222.13%	-16.46%
Minimum	70.57%			0.074	38.84%	73.49%	-16.46%
Maximum	438.18%			1.094	297.11%	461.15%	199.72%
Standard Deviation	1.1281				0.7277	0.9279	0.4613

Note: (1) Fiscal Decentralization is measured by the ratio of per capita provincial budgetary spending to per capita central budgetary spending

(2) Initial year for Xinjiang is 1985

Source: See Data Appendix

**Table 3: —SENSITIVITY RESULTS FOR BASIC VARIABLES: Base Case**

**Dependent Variable: Real Growth Rate (Y) , 1986 - 1992**

Variable		Coefficient	Standard Error	t	R-Square	Adjusted R-Square	S.E. of Regression	Other Variables
L (Labor)	high	0.44	0.312	1.41	0.373	0.247	0.043	I, R
	base	0.274	0.312	0.878	0.328	0.203	0.044	
	low	0.143	0.307	0.466	0.367	0.244	0.043	F
T (Tax Rate)	high	-0.115	0.154	-0.749	0.444	0.328	0.041	I, R, F
	base	-0.4069	0.155	-2.628	0.328	0.203	0.044	
	low	-0.4069	0.155	-2.628	0.328	0.203	0.044	
DCbe2	high	-0.047	0.0139	-3.413	0.367	0.244	0.043	F
	base	-0.05	0.014	-3.541	0.328	0.203	0.044	
	low	-0.069	0.014	-4.821	0.444	0.328	0.041	I, R, F

**Notes:**

1. All estimations have considered provincial fixed effects, but the results are not reported here.

2. Number of observations is 196.

3. DCbe2= decentralization measured by the ratio of per-capita provincial budgetary spending to per-capita central budgetary spending.

**Sources:**

See the data appendix.

**Table 4: —Estimates of Structural Changes**

**Dependent Variable: Real Growth Rate**

Variable	(1)=Base (1986-1992)	(2) (1980-1992)	(3) (1985-1989)	(4) (1986-1992)	(5) (1986-1992)	(6) (1986-1992)	(7) (1986-1992)	(8)= Base, average (1986-1992)	(9)= Non-base, average (1986-1992)
Constant								0.104 (4.13)	0.01 0.1945
L (Labor)	0.27 (0.677)	0.08 (0.191)	0.003 (0.009)	0.23 (0.79)	0.31 (0.99)	0.22 (0.727)	0.27 (0.894)	-0.23 (-4.06)	0.53 (1.30)
T (Tax Rate)	-0.41 (-2.626)	-0.21 (-1.532)	-0.18 (-0.905)	-0.38 (-2.579)	-0.31 (-1.76)	-0.38 (-2.468)	-0.35 (-2.348)	-0.08 (-0.523)	-0.004 (-0.037)
DCcse1				-3.12 (-5.16)					
DCcse2					-0.37 (-2.59)				
DCbe1						-2.15 (-3.715)			
DCebe1						-0.98 (-1.779)			
DCbe2	-0.05 (-3.54)	-0.01 (-4.37)	-0.09 (-5.46)				-0.02 (-1.6)	-0.003 (-519)	-0.02 (-2.85)
DCebe2							-0.10 (-4.25)		
R (Inflation Rate)									0.19 (0.324)
F (Openness)									0.15 (5.21)
I (Investment)									0.14 (2.33)
Number of Observations	196	308	137	196	196	196	196	28	28
R-Square	0.328	0.134	0.344					0.066	0.62
Adjusted R-Square	0.202	0.04	0.158	0.257	0.175	0.254	0.279	-0.051	0.512
S.E. Regression	0.04	0.09	0.04	0.0426	0.0451	0.0427	0.0421	0.022	0.015

Notes:

1. Estimation equations (1) - (7) have considered provincial fixed effects, but the results are not reported here.
2. Values of t-statistics appear in parentheses.
3. DCcse1= decentralization measured by the ratio of total provincial spending to total central spending.
4. DCcse2= decentralization measured by the ratio of per-capita provincial spending to per-capita central spending.
5. DCbe1= decentralization measured by the ratio of provincial budgetary spending to central budgetary spending.
6. DCebe1= decentralization measured by the ratio of provincial extra-budgetary spending to central extra-budgetary spending.
7. DCbe2= decentralization measured by the ratio of per-capita provincial budgetary spending to per-capita central budgetary spending.
8. DCebe2= decentralization measured by the ratio of [provincial extra-budgetary spending/provincial income] to [central extra-budgetary spending/national income].

Sources:



**Table 5: —SENSITIVITY RESULTS FOR FISCAL DECENTRALIZATION INDICATORS**  
**Dependent Variable: Real Growth Rate (Y), 1988 - 1992**

Variable		Coefficient	Standard Error	t	R-Square	Adjusted R-Square	S.E. Regression	Other Variables
L (Labor)	high	0.409	0.299	0.137	0.415	0.299	0.041	I, R
	base	0.235	0.299	0.788	0.373	0.257	0.043	
	low	0.112	0.288	0.389	0.428	0.318	0.041	F
T (Tax Rate)	high	-0.051	0.142	-0.361	0.513	0.411	0.038	I, R, F
	base	-0.0581	0.148	-0.2579	0.373	0.257	0.043	
	low	-0.0381	0.148	-0.2579	0.373	0.257	0.043	
DCcse1	high	-3.124	0.605	-5.163	0.373	0.257	0.043	
	base	-3.124	0.605	-5.163	0.373	0.257	0.043	
	low	-4.039	0.589	-6.857	0.484	0.381	0.039	R, F
L (Labor)	high	0.452	0.318	1.42	0.351	0.22	0.0438	I, R
	base	0.314	0.317	0.989	0.304	0.175	0.0451	
	low	0.1898	0.313	0.608	0.339	0.211	0.0441	F
T (Tax Rate)	high	-0.086	0.182	-0.473	0.364	0.238	0.0438	R, F
	base	-0.313	0.178	-1.759	0.304	0.175	0.0451	
	low	-0.313	0.178	-1.759	0.304	0.175	0.0451	
DCcse2	high	-0.304	0.142	-2.134	0.339	0.211	0.0441	F
	base	-0.372	0.144	-2.59	0.304	0.175	0.0451	
	low	-0.516	0.15	-3.371	0.351	0.22	0.0438	I, R
L (Labor)	high	0.404	0.3	1.347	0.418	0.298	0.0415	I, R
	base	0.218	0.3	0.727	0.375	0.254	0.0427	
	low	0.061	0.289	0.281	0.434	0.321	0.0408	F
T (Tax Rate)	high	-0.028	0.142	-0.199	0.531	0.429	0.0374	I, F
	base	-0.377	0.1514	-2.488	0.375	0.254	0.0427	
	low	-0.377	0.1514	-2.488	0.375	0.254	0.0427	
DCbe1	high	-2.138	0.564	-3.791	0.408	0.29	0.0417	I
	base	-2.147	0.578	-3.715	0.375	0.254	0.0427	
	low	-3.452	0.598	-6.99	0.5057	0.403	0.0382	R, F
DCebe1	high	-0.775	0.483	-1.604	0.5057	0.403	0.0382	R, F
	base	-0.858	0.539	-1.78	0.375	0.254	0.0427	
	low	-1.085	0.527	-2.022	0.408	0.29	0.0417	I
L (Labor)	high	0.402	0.303	0.133	0.41	0.291	0.0418	R
	base	0.285	0.297	0.894	0.398	0.279	0.0422	
	low	0.145	0.292	0.497	0.429	0.313	0.041	F
T (Tax Rate)	high	-0.0724	0.145	-0.498	0.507	0.4	0.0385	I, R, F
	base	-0.347	0.148	-2.348	0.398	0.279	0.0422	
	low	-0.347	0.148	-2.348	0.398	0.279	0.0422	
DCbe2	high	-0.021	0.015	-1.45	0.429	0.313	0.041	F
	base	-0.023	0.015	-1.516	0.398	0.279	0.0422	
	low	0.0419	0.0148	-2.836	0.507	0.4	0.0385	I, R, F
DCebe2	high	-0.089	0.0211	-4.208	0.47	0.36	0.0397	R, F
	base	-0.085	0.0224	-4.25	0.398	0.279	0.0422	
	low	-0.088	0.0217	-4.525	0.439	0.328	0.0408	I

Notes: For explanations of variables and data sources, see Table 2.

**Table 6: --Estimates with Openess and investment**

**Dependent Variable: Real Growth Rate**

Variable	(1)	(2)	(3)	(4)
	(1986-1992)	(1986-1992)	(1986-1992)	(1986-1992)
L (Labor)	0.39 (1.41)	0.39 (1.28)	0.37 (1.38)	0.38 (1.35)
T (Tax Rate)	-0.05 (-0.38)	-0.03 (-0.20)	-0.03 (-0.20)	-0.07 (-0.488)
DCcse1	-4.01 (-6.99)			
DCcse2		-0.49 (-3.37)		
DCbe1			-3.32 (-5.99)	
DCEbe1			-0.86 (-1.83)	
DCbe2				-0.04 (-2.84)
DCEbe2				-0.09 (-4.47)
R (Inflation Rate)	0.18 (3.59)	0.11 (2.04)	0.21 (4.19)	0.15 (2.98)
F (Openness)	0.29 (5.62)	0.23 (3.79)	0.32 (8.14)	0.24 (4.45)
I (Investment)	0.16 (3.06)	0.20 (3.30)	0.15 (2.89)	0.16 (3.41)
Number of Observations	198	198	198	198
Adjusted R-Square	0.411	0.281	0.429	0.400
S.E. Regression	0.038	0.042	0.037	0.038

**Notes:**

1. Values of t-statistics appear in parentheses.
2. DCcse1= decentralization measured by the ratio of total provincial spending to total central spending.
3. DCcse2= decentralization measured by the ratio of per-capita provincial spending to per-capita central spending
4. DCbe1= decentralization measured by the ratio of provincial budgetary spending to central budgetary spending.
5. DCEbe1= decentralization measured by the ratio of provincial extra-budgetary spending to central extra-budgetary
6. DCbe2= decentralization measured by the ratio of per-capita provincial budgetary spending to per-capita central
9. DCEbe2= decentralization measured by the ratio of [provincial extra-budgetary spending/provincial income] to [central extra-budgetary spending/national income].

Sources:

See the Data Appendix.

**Table 7: --Estimates with Random Effects (GLS)**

**Dependent Variable: Real Growth Rate**

Variable	(1) (1986-1992)	(2) (1986-1992)	(3) (1986-1992)	(4) (1986-1992)	(5) (1986-1992)
Constant	0.166 (6.09)	0.229 (8.768)	0.233 (8.885)	0.144 (6.057)	
L (Labor)	0.17 (0.561)	0.20 (0.685)	0.18 (0.6349)	0.22 (0.725)	0.20 (.705)
T (Tax Rate)	-0.38 (-2.88)	-0.41 (-3.09)	-0.43 (-3.176)	-0.38 (-2.28)	-0.32 (-2.36)
DCcse1		-1.78 (-3.87)			
DCcse2				-0.08 (-0.996)	
DCbe1	-0.02 (-1.79)		-1.54 (-3.009)		
DCEbe1			-0.24 (-0.53)		
DCbe2					0.01 (0.4986)
DCEbe2					-0.09 (-4.40)
Number of Observations	196	196	196	196	196
S.E. Regression	0.043	0.041	0.043	0.041	0.041

**Notes:**

1. Values of t-statistics appear in parentheses.
2. DCcse1= decentralization measured by the ratio of total provincial spending to total central spending.
3. DCcse2= decentralization measured by the ratio of per-capita provincial spending to per-capita central spending.
4. DCbe1= decentralization measured by the ratio of provincial budgetary spending to central budgetary spending.
5. DCEbe1= decentralization measured by the ratio of provincial extra-budgetary spending to central extra-budgetary spending.
6. DCbe2= decentralization measured by the ratio of per-capita provincial budgetary spending to per-capita central budgetary spending.
9. DCEbe2= decentralization measured by the ratio of [provincial extra-budgetary spending/provincial income] to [central extra-budgetary spending/national income].

Sources:

See the Data Appendix.

## References

- [1] Bahl, Roy W. and Johannes Linn (1992) *Urban Public Finance in Developing Countries*. New York: Oxford University Press.
- [2] Bahl, Roy W. and Christine Wallich (1992) "Intergovernmental Fiscal Relations in China." Working Papers, Policy Research Department, World Bank, Washington D.C..
- [3] Barro, Robert, and Sala-i-Martin (1992) "Public Finance in Models of Economic Growth" *Review of Economic Studies*, 59: 645–661.
- [4] Barro, Robert (1990) "Government Spending in a Simple Model of Endogenous Growth." *Journal of Political Economy*, 98: S103–S125.
- [5] 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, World Bank, Washington D.C..
- [6] Bird, Richard M. (1993) "Threading the Fiscal Labyrinth: Some Issues in Fiscal Decentralization," *National Tax Journal*, XLVI, no. 2: 207-227.
- [7] Davoodi, H., Danyang Xie, and Heng-fu Zou (1995) "Fiscal Decentralization and Economic Growth in the United States." Policy Research Department, World Bank, Washington, D.C.

- [8] Devarajan, Shantayanan, Vinaya Swaroop, and Heng-Fu Zou (1996) "The Composition of Public Spending and Economic Growth." *Journal of Monetary Economics*, April.
- [9] Feder, Gershon (1983) "On Exports and Economic Growth." *Journal of Development Economics* 12: 59-73.
- [10] Gramlich, Edward, and H. Galper (1973) "State and Local Fiscal Behavior and Federal Grant Policy, *Brookings Papers on Economic Activity* 1: 15-65.
- [11] Gramlich, Edward M. (1993) "A Policy maker's Guide to Fiscal Decentralization" *National Tax Journal*, Vol XLVI, No. 2: 229-235.
- [12] Jia, Hao and Zhimin Lin, (Eds.) (1994) " Changing Central-local Relations in China." Boulder: Westview Press.
- [13] Levine, Ross, and David Renelt (1992) "A Sensitivity Analysis of Cross-Country Growth Regressions." *American Economic Review*, 82, No.4: 942-963.
- [14] Oates, Wallace E. (1972) *Fiscal Federalism*. New York: Harcourt Brace Jvanovich.
- [15] Oates, Wallace E. (1993) "Fiscal Decentralization and Economic Development," *National Tax Journal*, XLVI, no. 2: 237-243.
- [16] Peltzman, Sam (1980) "The Growth of Government" *The Journal of Law and Economics*, 23: 209-287.

- [17] Prud'homme, Remy (1995) "The Dangers of Decentralization." *The World Bank Research Observer*, Washington D.C..
- [18] Romer, Paul (1986) "Increasing Returns and Long-Run Growth." *Journal of Political Economy*, 94: 1002-1037.
- [19] Rosen, Harvey (Ed.) 1988. *Fiscal federalism: Quantitative studies*. The University of Chicago Press.
- [20] Shirk, Susan L (1993) "The Political Logic of Economic Reform in China." University of California Press.
- [21] Tiebout, Charles (1956) "A Pure Theory of Local Public Expenditure." *Journal of Political Economy*, 64: 416-424.
- [22] Wong, Christine P.W., Christopher Heady, and Wing Thyee Woo (1993) "Economic Reform and Fiscal Management in China: Report of Technical Assistance Project." Asian Development Bank and Ministry of Finance of China.
- [23] Wong, Christine P.W.(1991) "Central-local Relations in an Era of Fiscal Decline: The Paradox of Fiscal Decentralization in Post-Mao China." *China Quarterly*, December.
- [24] World Bank (1995) "Macroeconomic Stability in a Decentralized Economy." China and Mongolia Department, Washington D.C..
- [25] World Bank(1992) "China: Reforming Intergovernmental Fiscal Relations." World Bank Discussion Papers, China and Mongolia Department, Washington D.C..

- [26] World Bank(1990) "Revenue Mobilization and Tax Policy." A World Bank Country Study, Washington D.C..
- [27] Zhou, Xiao-chuan and Zhigang Yang (1992) "Fiscal Management and Tax System in China: Problems and Solutions (*Zhongguo Caishui Tizhi de Wenti yu Chulu*)." *Tijin* People's Press.
- [28] Zou, Heng-fu (1994) "Dynamic Effect of Federal Grants on Local Spending." *Journal of Urban Economics* 36: 98-115, 1994.
- [29] Zou, Heng-fu (1995) " Taxes, Federal Grants, Local Public Spending and Growth." (forthcoming) *Journal of Urban Economics*.









**Policy Research Working Paper Series**

	<b>Title</b>	<b>Author</b>	<b>Date</b>	<b>Contact for paper</b>
WPS1585	Public Finances and Economic Transition	Luca Barbone Hana Polackova	March 1996	C. Pelegrin 85087
WPS1586	Did External Barriers Cause the Marginalization of Sub-Saharan Africa in World Trade?	Azita Amjadi Ulrich Reincke Alexander Yeats	March 1996	S. Lipscomb 33718
WPS1587	Payments and Finance Problems in the Commonwealth of Independent States	Constantine Michalopoulos	April 1996	M. de la Puente 31206
WPS1588	Social Insurance in the Transition to a Market Economy: Theoretical Issues with Application to Moldova	Deborah Mabbett	April 1996	L. Biely 36280
WPS1589	The Analysis of Emerging Policy Issues in Development Finance	Sudarshan Gooptu	April 1996	R. Vo 31047
WPS1590	The Latvian Banking Crisis: Lessons Learned	Alex Fleming Samuel Talley	April 1996	S. Coffey 32535
WPS1591	Competition in Network Industries	Michael Klein	April 1996	S. Vivas 82809
WPS1592	The Stockmarkets as a Source of Finance: A Comparison of U.S. and Indian Firms	Cherian Samuel	April 1996	C. Samuel 30802
WPS1593	Rural Finance for Growth and Poverty Alleviation	Saeed Qureshi Ijaz Nabi Rashid Faruqee	April 1996	C. Anbiah 81275
WPS1594	Why Have Some Indian States Done Better Than Others at Reducing Rural Poverty?	Gaurav Datt Martin Ravallion	April 1996	P. Sader 33902
WPS1595	In Search of Owners: Lessons of Experience with Privatization and Corporate Governance in Transition Economies	Cheryl W. Gray	April 1996	M. Geller 31393
WPS1596	Agrarian Structure in Poland: The Myth of Large-Farm Superiority	Johan van Zyl Bill R. Miller Andrew Parker	April 1996	M. Williams 87297
WPS1597	Egypt and the Uruguay Round	Bernard Hoekman Arvind Subramanian	May 1996	F. Hatab 35835
WPS1598	Logistical Constraints on International Trade in the Maghreb	Francois Amiot Ovadia Salama	May 1996	L. Lewis 37369

**Policy Research Working Paper Series**

<b>Title</b>	<b>Author</b>	<b>Date</b>	<b>Contact for paper</b>
WPS1599 Economic Implications for Turkey of a Customs Union with the European Union	Glenn W. Harrison Thomas F. Rutherford David G. Tarr	May 1996	M. Patena 39515
WPS1600 Is Commodity-Dependence Pessimism Justified? Critical Factors and Government Policies that Characterize Dynamic Commodity Sectors	Nanae Yabuki Takamasa Akiyama	May 1996	G. Ilogon 33732
WPS1601 The Domestic Benefits of Tropical Forests: A Critical Review Emphasizing Hydrological Functions	Kenneth M. Chomitz Kanta Kumari	May 1996	PRDEI 80513
WPS1602 Program-Based Pollution Control Management: The Indonesian PROKASIH Program	Shakeb Afsah Benoit Laplante Nabiel Makarim	May 1996	A. Williams 37176
WPS1603 Infrastructure Bottlenecks, Private Provision, and Industrial Productivity: A Study of Indonesian and Thai Cities	Alex Anas Kyu Sik Lee Michael Murray	May 1996	S. Ward 31707
WPS1604 Costs of Infrastructure Deficiencies in Manufacturing in Indonesia, Nigeria, and Thailand	Kyu Sik Lee Alex Anas Gi-Taik Oh	May 1996	S. Ward 31707
WPS1605 Why Manufacturing Firms Produce Some Electricity Internally	Kyu Sik Lee Alex Anas Satyendra Verma Michael Murray	May 1996	S. Ward 31707
WPS1606 The Benefits of Alternative Power Tariffs for Nigeria and Indonesia	Alex Anas Kyu Sik Lee	May 1996	S. Ward 31707
WPS1607 Population Aging and Pension Systems: Reform Options for China	F. Desmond McCarthy Kangbin Zheng	May 1996	M. Divino 33739
WPS1608 Fiscal Decentralization, Public Spending, and Economic Growth in China	Tao Zhang Heng-fu Zou	May 1996	C. Bernardo 37699