

Fiscal Decentralization and Economic Growth in China*

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I. Introduction

The Chinese economy has grown at a record-setting rate of about 10% annually, since the launching of the economic reforms in 1978. Many factors have played important roles in the growth process. These include, among others, rural reforms that made the household the unit of agricultural production, enterprise reforms that introduced material incentives to enterprise management, various price reforms, the importation of technology, the opening up of the market to international trade and foreign investment, and a flourishing nonstate sector. An important aspect of this multifaceted reform, the fiscal reform initiated in the early 1980s, has not been examined adequately. Our main concern is to investigate whether fiscal decentralization has contributed positively to the growth process of the Chinese economy.

In a broad sense, fiscal decentralization is much the same in China as elsewhere in the world in that the central government relinquishes its fiscal controls to subnational governments. According to the proponents of fiscal decentralization, such a shift of fiscal power and responsibility to lower levels of government can increase economic efficiency because governments at lower levels have informational advantages over the central government concerning resource allocation.¹ In other words, subnational governments are in a better position to provide the kind of public goods and services that closely meet local needs. Furthermore, when local government officials are responsible for the provision of public services, they are under closer scrutiny by their constituencies and, as a result, have a greater incentive to exercise their fiscal responsibilities in the best interest of the general public.² In addition, local governments in

China control the majority of the country's enterprises. Fiscal decentralization may harden the budget constraints of local enterprises and, consequently, improve the local enterprises' efficiency and lead to higher and more sustainable economic growth.³ Fiscal decentralization also may bring about dynamic gains to the economy. Recent endogenous growth literature has illustrated that institutional arrangements affect economic growth.⁴ It is conceivable, therefore, that a change from a centralized to a decentralized fiscal system can increase the long-term rate of economic growth.⁵

Some scholars have challenged the significance of the efficiency gain that fiscal decentralization can bring about. First, the alleged informational advantage of the local government may in fact not be significant. The central government can assign its representatives to local offices where they could gain sufficient knowledge about the local preferences and thus play a role in the resource allocation process under a centralized fiscal system. Second, the central government can also involve officials at the subnational level in the decision process. Third, there is the question of whether local officials are necessarily better informed, given that they are not elected in democratic elections in most developing countries; even if they are indeed better informed, there is still the question of whether they have greater incentive to act on the information.⁶ Moreover, as local governments in China directly own most local enterprises, they could set up trade barriers to protect local enterprises, causing fragmentation of markets, rent seeking, and other efficiency losses.

During the 1980s, the Chinese fiscal system underwent some important changes. It was changed from a unitary system, in which the central government had absolute control over revenue collection and budget appropriation, to a relatively decentralized arrangement, in which revenues were shared by the central and provincial governments. Under this arrangement, most of the provincial governments were required to remit a portion of their budget revenues to the central government. In cases in which provincial revenues could not cover the specified expenditures, the central government would provide some subsidies to those provinces. Similar fiscal arrangements were made between successive tiers of governments at subnational levels.

Understanding the role of fiscal reform in the growth process thus far is important for future reforms in China. If the changes in the fiscal system are conducive to economic growth, as the proponents have argued, then future reforms should aim at fortifying and institutionalizing the position of the decentralized system. If, however, fiscal decentralization is ineffective in bringing about economic growth, China may be better off with a more centralized fiscal system or may implement corresponding reforms in other areas to reap the full benefits of a decentralized fiscal arrangement.

The significance of our study goes beyond an assessment of the economic reforms in China. The World Bank and other international organizations have actively engaged in studying and evaluating various fiscal reform programs implemented in many countries, such as China, Brazil, and Argentina, in the hopes of drawing useful lessons for others to follow. The findings of this study, therefore, can have far-reaching practical value for the international community as a whole. At the theoretical level, our study also makes a contribution to the economics literature by providing an empirical test of whether fiscal decentralization increases economic efficiency.

Studies on China's economic reforms are numerous, but few focus on evaluating the impacts of fiscal reforms on economic growth.⁷ The studies by T. Zhang and H. Zou and by J. Ma are two exceptions.⁸ Zhang and Zou find that fiscal decentralization has been detrimental to economic growth, whereas Ma reaches the opposite conclusion. However, these scholars' results should be interpreted with caution because they used a problematic measure for decentralization in their analyses and failed to take into account other concurrent reforms.

In this study, we examine the effect of fiscal decentralization on economic growth by using a production-function-based regression analysis framework that has been widely adopted in the empirical literature on economic growth. Our estimation results, based on a province-level panel data set from 1970 to 1993, suggest that fiscal decentralization has made a positive contribution to the growth process. We also find that rural reform, the nonstate sector, and capital accumulation along with fiscal reform are the key driving forces of China's impressive growth over the past 20 or so years.

The innovation of the current study is twofold. First, we include separate proxies for major reforms in the empirical investigation, while focusing on the effect of the changes in the fiscal system on the rate of economic growth. Second and more important, unlike previous scholars, we measure the degree of fiscal decentralization by a marginal retention rate—the rate at which revenue increments are retained by provincial governments.

The rest of the article proceeds as follows. In Section II, we provide an overview of the fiscal reforms in China in the 1980s, concentrating on the changes in fiscal relations between the central and provincial governments. We then set out the econometric model in Section III and briefly discuss the data set in Section IV. In Section V, we report the estimation results. In the last section, we summarize the conclusions of the study.

II. Fiscal Decentralization in China

The fiscal system in China was highly centralized before the reforms.⁹ The financial relation between the central and provincial governments

was labeled *tongshou tongzhi* (unified revenue collection and budget appropriation). No subnational governments had a separate budget; the central government collected all revenues and prepared a consolidated budget for governments at all administrative levels. This financial arrangement was extended to state-owned enterprises (SOEs), as they were required to remit all profits or financial surpluses to the state, and the state covered all their expenditures by fiscal appropriation. In effect, the financial management of the SOEs was a part of state finance.

The centralized fiscal system was consistent with China's centralized production and resource allocation system that had been adopted during the prereform era but was incompatible with the market-oriented reforms embarked on in 1978. There are three major driving forces behind the changes in China's fiscal system. The first is that the remarkable growth of non-state-owned enterprises—township and village enterprises, joint ventures, and private firms—has undermined the dominance of state enterprises. Loss-making state enterprises have been increasing and have become a great drain on the fiscal system. Thus, the government has been forced to turn to alternative revenue sources. Second, the balance of political power has shifted toward local autonomy as a result of the economic reforms. It is natural for subnational governments to demand a commensurate decision-making power in the fiscal arena as a consequence of their greater political autonomy. The third impetus to decentralize the fiscal system stems from purely economic reasons. As it became clear that economic interests greatly influence the behavior of individuals as well as governmental bodies, the centralized fiscal system had to be changed in order to provide local governments with incentives to step up the effort of revenue collection and to promote economic growth.

Like other reforms, fiscal reform started as an experiment. As early as in 1977, Jiangsu province was chosen to try out an alternative fiscal arrangement with the central government. Under this arrangement, the province was contracted to remit a share of its total revenues each year to the central government. The share was determined according to historical records of local revenues and expenditures of the province.

In 1980, the central government enacted revenue-sharing arrangements under the principle of dividing revenues and expenditures with each level of government responsible for balancing its own budget. Under this arrangement, revenues were classified by source and divided into central fixed revenues (including customs duties and revenues remitted by centrally owned state enterprises), local fixed revenues (including salt taxes, agricultural taxes, revenues remitted by locally owned state enterprises, and other taxes and levies of a local nature), and central-local shared revenues (including profits of large-scale enterprises under dual leadership by the central and local government, and industrial and commercial taxes or turnover taxes).

TABLE I
CENTRAL-PROVINCE FISCAL ARRANGEMENTS AND MARGINAL
RETENTION RATE

PROVINCE	1985-87		1988-93	
	Sharing Scheme	FD	Sharing Scheme	FD
Beijing	a	49.55	b	100.00
Tianjin	a	39.45	a	46.55
Shanghai	a	23.54	c	100.00
Hebei	a	69.00	b	100.00
Shanxi	a	97.50	a	87.55
Liaoning	a	51.08	b	100.00
Heilongjiang	c	100.00	c	100.00
Jiangsu	a	40.00	b	100.00
Zhejiang	a	55.00	b	100.00
Anhui	a	80.10	a	77.50
Shandong	a	59.00	c	100.00
Henan	a	80.00	b	100.00
Hunan	a	88.00	d	100.00
Hubei	a	100.00	a	100.00
Sichuan	a	100.00	a	100.00
Shaanxi	e	100.00	e	100.00
Jilin	e	100.00	e	100.00
Jiangxi	e	100.00	e	100.00
Gansu	e	100.00	e	100.00
Inner Mongolia	f	100.00	e	100.00
Xinjiang	f	100.00	e	100.00
Guangxi	f	100.00	e	100.00
Ningxia	f	100.00	e	100.00
Yunnan	f	100.00	e	100.00
Guizhou	f	100.00	e	100.00
Qinghai	f	100.00	e	100.00
Guangdong	c	100.00	e	100.00
Fujian	e	100.00	e	100.00

SOURCES.—Sharing scheme, 1985-87 = Dangdai Zhongguo Caizheng Huiban Weiyuanhui, *Dangdai Zhongguo Caizheng* (Public finance in modern China) (Beijing: China Social Science, 1988), pp. 376-77; Sharing scheme, 1988-93 = Xingmin Zhu, ed., *Jiangsu Sheng Caizheng Guanli Tizhi Gaige Yu Shijian* (Reform and practice of financial system and management in Jiangsu province) (Beijing: China Financial and Economic, 1993), pp. 294-96.

NOTE.—Sharing schemes: a = remitting a share of the local revenues; b = remitting a share of local revenue in the base year and the total remittance increases at a predetermined rate in the subsequent years; c = remitting a fixed amount of the revenues to the central government; d = remitting a fixed amount in the base year and the total remittance increases at a predetermined rate in subsequent years; e = receiving a fixed amount of subsidy from the central government; and f = receiving a fixed amount of subsidy in the base year and the total subsidy increases at a predetermined rate in subsequent years; FD = fiscal decentralization.

There were some exceptions to the 1980 arrangement. Guangdong and Fujian were required to remit a lump sum to the central government each year and were allowed to retain the rest of their revenues. The five minority autonomous regions (Xizan, Xinjiang, Ningxia, Inner Mongolia, and Guangxi) and the three poor and remote provinces with large numbers of minority people (Qinghai, Yunnan, and Guizhou) received subsidies that were to increase at an annual rate of 10%.

However, despite promises to keep the sharing schemes unchanged for 5 years, there were frequent changes made to the sharing rules, especially during 1982–83. The 1980 arrangement was very short-lived.

In 1985, a major change occurred with the reform of the tax system and the replacement of state enterprises' profit remittances with income taxes. Although revenues were still divided into three categories—central fixed, local fixed, and shared—the criteria for the divisions were changed. Whereas the previous divisions were based primarily on the ownership of state enterprises, the new divisions were related to tax categories.¹⁰

To accommodate different local social and economic conditions, four types of revenue-sharing arrangements were introduced. Fourteen provinces, including three municipalities, were contracted to remit a specific share of their local fixed and shared revenues. Guangdong and Heilongjiang received the most favorable provisions, which required remittance of a lump sum of revenues to the central government. Five provinces received lump sum transfers from the central government, while the remaining seven provinces received central subsidies that were stipulated to increase at an annual rate of 10% in subsequent years.

The 1985 fiscal arrangement ensured that central and local fixed revenues accounted for a relatively small part of the total government budget, and the main portion was specified as shared revenue. This meant that the central government now relied on local governments to increase total revenues and to provide resources to the central government. Because local governments could retain some of the shared revenues, it was in their interest to increase these revenues.

In 1988, the arrangements were changed again under fiscal contracting. Five types of sharing schemes were established, as opposed to four types during 1985–87. The sharing formula for each province is reported in table 1.

III. Econometric Model

To examine the effect of fiscal decentralization on economic growth, we adopt a production-function-based estimation framework that has been widely used in the empirical literature on economic growth.¹¹ We assume a Cobb-Douglas production function, so production at time t can be described as

$$y(t) = A(t)k(t)^\alpha \varphi^{1-\alpha}, \quad (1)$$

where y denotes the output per capita, k the capital per capita, A the level of technology, φ the fraction, (assumed to be constant) of the population in the labor force, and $0 < \alpha < 1$. Expressing equation (1) in log form and taking first-order differentiation with respect to time, we find that the growth rate of output per capita is

$$g(t) = \dot{y}(t) = \dot{A}(t) + \alpha \dot{k}(t). \quad (2)$$

In equation (2), the growth rate of output per capita depends on two factors: the growth rate of capital per capita and the rate of technological progress. It should be noted that the term $\dot{A}(t)$ reflects not just technology but also differences in resource endowments and institutions across regions and over time, as well as in other unobservable region-specific characteristics. In this study, we assume that $\dot{A}(t)$ depends on two sets of variables.

The first set includes variables that explicitly measure two of the most important reform programs implemented during the reform period. They are fiscal decentralization (FD) and the household responsibility system (HRS). The effect of fiscal decentralization on economic growth is the central concern of the study. However, since fiscal decentralization constitutes only one aspect of the multifaceted reform effort in China and is likely to correlate with others, controlling for the effects of other reform measures is crucial for evaluating the direct effect of fiscal decentralization. Previous studies have ignored this point, and, therefore, their conclusions should be considered with caution. The HRS reform has been the most important source of agricultural growth in the reform period.¹² This reform has also increased farmers' autonomy and led to the emergence of township and village enterprises, which have been the most dynamic force of China's recent rapid growth. We also include the relative price of farm products to nonfarm products (FPMP) to measure the impact of the price liberalization, which has substantially raised the relative price of agricultural products. The effects of other policy reforms, such as the enterprise reforms, the open-door policy, and so on are not directly measured because of the lack of appropriate proxies. However, the year dummies in the regression models will indirectly capture their effects.

Included in the second group of variables are those that capture regional differences in resource endowments. Fiscal capacity (FISCAP), defined as a 3-year moving average of per capita real gross domestic product (GDP), reflects the financial strength of a region. The percent of rural population (POPSHR) and the total population (TPOP) are used to ascertain the impact of urbanization and the size of the population on economic growth. The relative importance of non-state-owned enter-

prises in the industrial sector, measured by the share of non-SOEs' output in the total industrial output (NSOESH), is introduced to capture the role of non-SOEs in the growth process.

We use the growth rate of per capita investment, in real terms, in fixed assets as a proxy for the growth rate of per capita capital. The growth regression equation is thus specified as a two-way error component model:¹³

$$\begin{aligned} \text{GGDP}_{it} = & \beta_1 \text{FD}_{it} + \beta_2 \text{HRS}_{it} + \beta_3 \text{NSOESH}_{it} \\ & + \beta_4 \text{GI}_{it} + \beta_5 \ln(\text{FISCAP})_{it} + \beta_6 \text{FPMP}_{it} \\ & + \beta_7 \text{POPSHR}_{it} + \beta_8 \ln(\text{TPOP})_{it} + \mu_i \\ & + \lambda_t + v_{it}, \quad i = 1, \dots, N; t = 1, \dots, T, \end{aligned} \quad (3)$$

where i denotes province, t denotes time, GGDP_{it} is the growth rate of per capita GDP, GI_{it} the growth rate of per capita investment, μ_{it} the unobservable individual effect, λ_t the unobservable time effect, and v_{it} the remainder stochastic disturbance term. Note that λ_t is province-invariant, and it accounts for any time-specific effect that is not included in the regression. This is particularly important for our analysis because the growth pattern of the Chinese economy has been largely dictated by the pattern of the central government's macroeconomic policies. Expansionary macroeconomic policies result in high growth and high inflation, which, in turn, lead to austerity and low growth. Failing to account for such time-specific macroenvironments may result in a biased assessment of the effect of fiscal decentralization on economic growth.

There is an additional question about the specification of the regression model. If the μ_i and λ_t are assumed to be fixed parameters to be estimated and the remainder disturbances stochastic with $v_{it} \sim \text{IID}(0, \sigma_v^2)$, then equation (3) is a two-way fixed-effects error component model. If all three components of the error term are stochastic, equation (3) amounts to a two-way random-effects error component model. Since there is no compelling theoretical argument in favor of one specification over the other, we choose the fixed-effects over the random-effects model based strictly on the results of the Hausman specification test.¹⁴

It is important to note that fiscal decentralization provides local authorities with more resources that they can invest and, thus, they are able to spend more. Therefore, fiscal decentralization may affect economic growth by raising investments. Part of the effects of fiscal decentralization on economic growth would consequently be accounted for by the growth rate of GI investment growth in equation (3). Fiscal decentralization may also contribute to growth by improving the efficiency of resource allocation at the local level. If it results in more investment in infrastructure or more efficient allocation of resources, say, more invest-

ment in high-productivity sectors and less investment in low-productivity sectors, fiscal decentralization will influence the long-term rate of economic growth. Such an effect is captured by the coefficient of FD in our growth equation and is the main concern of our empirical investigation.

IV. Data

Our empirical analyses are based on province-level panel data from 28 of the 30 provinces (including three municipalities, Beijing, Shanghai, and Tianjin) in mainland China for the period 1970–93.¹⁵ Table 2 contains the list of variables used, their definitions, and their mean values. Per capita real GDP data are taken from *The Gross Domestic Product of China, 1952–1995*.¹⁶ Government revenues and expenditures are taken from *Compilation of Historical Statistics for Each Province, Autonomous Region, and the Directly Administered Municipality, 1949–1989* and various issues of the *Statistical Yearbook of China*.¹⁷ Data on fixed-asset investment are taken from the statistical yearbooks of the sample provinces. All these data are constructed with the actual figures in current prices and indexes from 1970 to 1993 to obtain corresponding figures in real terms (in 1970 prices). We took the share of non-SOEs' output in the total industrial output and the numbers of the total and rural populations from various issues of the *Statistical Yearbook of China*. We calculated the relative price of farm products relative to nonfarm products from the information collected from *Price Statistical Yearbook of*

TABLE 2
DEFINITIONS AND MEAN VALUES OF VARIABLES USED

Variable	Definition	Mean Value
GGDP	Growth rate of real per capita GDP (%)	.071
FD	Fiscal decentralization: the marginal retention rate of locally collected budgetary revenue (%)	.424
HRS	Household responsibility system: the percentage of production teams in rural areas that adopted the system (%)	.607
FISCAP	Fiscal capacity: the moving average of real per capita GDP in the preceding 3 years (in yuan/person)	644
POPSHR	Rural population (%)	.760
TPOP	Total population (in thousands)	36,568
FPMP	Relative price of farm products to nonfarm product: the ratio of state's real procurement price index for farm products to real price index of manufacture goods in rural area	1.550
NSOESH	Share of Non-SOEs' output in the total industrial output (%)	.290
GI	Growth rate of per capita fixed asset investment (in real term) (%)	.062
FDAVG	An alternative measure for fiscal decentralization: the average retention rate of locally collected budgetary revenue (%)	.592

*China*¹⁸ and all the aforementioned data sources. The HRS index measures the percentage of production teams in rural areas that adopted the system.¹⁹

Measuring fiscal decentralization is a key challenge in our work. Cross-country studies have used the ratio of state spending to federal spending as a proxy for fiscal decentralization. However, such a measure is not feasible because data on central spending by province in China are not available. Alternative measures must be sought. There are two empirical studies on fiscal reforms in China, each using a different decentralization measure. Ma measures the degree of fiscal decentralization by the average share of government budgetary revenue retained by a province.²⁰ This proxy, although appealing, fails to capture the dramatic change in the central-province fiscal relations initiated in the 1980s for two reasons. First, many provinces had been net contributors to the central government's budget even in the prereform period, that is, they collected more revenues than they spent. Thus, by Ma's measure, fiscal decentralization would have started much earlier even though, under the unified-collection-and-budget-appropriation system, central approval was essential for any spending at the provincial level. The second reason is related to the fact that Ma's measure is an average, rather than the marginal retention rate. It is the rate at the margin that is expected to influence the behavior of provincial or subprovincial governments.

The second empirical study of fiscal decentralization in China is by Zhang and Zou.²¹ They measure fiscal decentralization by the ratio of provincial spending to total central spending (or a variant). This measure is questionable. Since their province-specific decentralization measure shares a common denominator—the total spending of the central government—the degree of fiscal decentralization is entirely determined by the local spending of a province. The larger the local spending, the greater the fiscal decentralization is said to be. Thus, the province with the highest local spending would also be the one that enjoys the highest degree of fiscal latitude. In reality, however, this is hardly the case because the magnitude of fiscal spending in a province reflects the population and economic size of the province instead of its fiscal freedom. For example, Sichuan, the province with the highest provincial spending, did not actually enjoy more fiscal leeway than did Guangxi, a much smaller province. Similarly, Shanghai had a larger fiscal expenditure than Tianjin but did not have more fiscal freedom.

Another important issue that is overlooked by previous studies concerns the effective starting point of fiscal decentralization in China. It is true, as we noted earlier, that China's fiscal reform started in the early 1980s. But the revenues that were shared by the central and provincial governments were small. Moreover, the changes in the fiscal relations between the central and provincial governments were, to a large extent, experimental and temporary during 1980–84. The revenue sharing rules

were not set for multiple years and were subject to annual negotiations between the two tiers of governments. Some scholars have pointed out that many of the fiscal changes planned in this brief 4-year period were short-lived.²² From the viewpoint of provincial governments, there was a great deal of uncertainty about the future fiscal policies of the central government. It is quite possible that the best strategy for provincial governments was to retain the status quo. In contrast, the fiscal reforms from 1985 onward were much more clearly defined. The revenue sharing rules initially were fixed for 3 years and then for a longer period of time. Although the agreed-on sharing formulas were changed in a few instances during the contract period, they were largely followed.

In this study, we consider fiscal decentralization to start in 1985 and measure it by the marginal retention rate of locally collected budgetary revenues by provincial governments. As discussed in Section II, there were four types of central-province fiscal arrangements in 1985–87 and five types in 1988–93. Our fiscal decentralization measure is determined by how much of the revenue increments were kept by provincial governments. In cases where provinces were permitted to retain a share of their revenues, FD is equal to the share specified. Fourteen provinces in 1985–87 and five provinces in 1988–93 were in this category. The remaining types of arrangements imply a 100% marginal retention rate.²³ The marginal retention rates for the sample provinces are reported in table 1 in the columns titled FD. The fiscal decentralization measure assumes the value of zero for all provinces prior to 1985.²⁴

V. Results

Table 3 reports the basic regression results on the growth rate of per capita GDP. Table 4 presents robustness tests of the results to alternative specifications of the measure for fiscal decentralization. Note, first, the test statistics reported at the bottom of table 3. The row titled HN contains the Hausman statistics for testing the random-effects model against the fixed-effects model. As the chi-square statistics indicate, the Hausman specification test rejects the random-effects model as a valid specification. The row titled LR shows the results of likelihood ratio tests concerning the hypothesis of no fixed effects. As the chi-squared statistics are greater than the critical values corresponding to the 1% level of significance, the tests argue in favor of the two-way fixed-effects model against the classical regression with no fixed effects. Thus all regressions are specified as two-way fixed-effects models. In the interest of simplicity, the estimates for province and year dummies are not reported in the tables but are available to the reader on request. The Breusch-Pagan Lagrange multiplier test rejects the null hypothesis of homoscedasticity.²⁵ Therefore, we report in parentheses the *t*-statistics that are based on heteroscedasticity-consistent standard errors.²⁶

TABLE 3
GROWTH RATE OF PER CAPITA GDP REGRESSION

VARIABLE	Model				
	1	2	3	4*	5†
FD	.0362 (2.703)	.0349 (2.595)	.0265 (2.049)	.0259 (1.659)	.0271 (2.039)
HRS	.0372 (1.768)	.0408 (1.951)	.0448 (2.163)	.0565 (2.304)	.0336 (1.685)
GI	.0478 (3.819)	.0493 (3.897)	.0459 (3.692)	.0538 (2.879)	.0237 (1.919)
FISCAP	-.144 (-5.308)	-.126 (-4.509)	-.157 (-5.664)	-.138 (-3.810)	-.125 (-3.804)
NSOESH	.142 (3.163)	.145 (3.288)	.203 (4.116)	.259 (3.811)	.173 (4.052)
FPMP	.0107 (1.158)	...	.00522 (.575)	-.0172 (-1.149)	.00575 (.576)
POPSHR	.0446 (.630)	...	.0353 (.509)	-.0746 (-.422)	-.0545 (-.782)
TPOP	-.209 (-1.612)	...	-.310 (-2.366)	-.405 (-2.634)	.137 (3.960)
Subsidy Dummy	...	...	.0275 (3.648)	...	...
HN‡	36.31 [8]	34.13 [5]	35.20 [9]	20.24 [9]	37.98 [9]
LR‡	289.29 [47]	285.14 [47]	286.40 [47]	181.34 [35]	215.71 [42]
Adjusted R^2	.52	.52	.53	.56	.51
Sample size	534	534	534	294	406

NOTE.—Province and year dummies are included in all models; estimates are corrected for heteroscedasticity according to Halbert White ("A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity," *Econometrica* 48 [May 1980]: 817–38); t -statistics are in parentheses; HN = Hausman test statistics for testing the random-effects model against the fixed-effects model; LR = likelihood ratio test statistics for testing the fixed-effects model against the classical regression model with no fixed effects; otherwise, variables are as defined in table 2.

* Estimates are based on the subsample, excluding provinces that received subsidy from the central government.

† Estimates based on the subsample 1979–93.

‡ Numbers in square brackets are degrees of freedom associated with χ^2 -statistics.

A. Basic Results

Model 1 of table 3 is a straightforward estimation of equation (3). Fiscal decentralization is shown to have a positive and significant effect on the growth rate of per capita GDP. The estimate, 0.0362, implies that, ceteris paribus, the growth rate of per capita GDP should rise by 3.62 percentage points in response to a fiscal reform that raises the marginal retention rate of budgetary revenue from 0 to 100%. Rural reform is also shown to have a positive and significant impact on the growth rate. As expected, the growth rate of fixed capital investment is positively and significantly associated with the growth rate. The price reform variable is insignificant. The estimate for NSOESH is positive and statistically significant, indicating that the nonstate sector has become an important impetus for

economic growth. The coefficient for FISCAP is negative and statistically significant, implying that richer provinces tend to grow at a lower rate. This evidence suggests conditional convergence in income levels across provinces in China. Other variables that capture the differences in initial conditions across different regions are generally insignificant.

To examine whether the estimated effect of fiscal decentralization is sensitive to the inclusion of insignificant variables, we estimate model 2. The estimates hardly vary.

Recall that the degree of fiscal decentralization is measured by the marginal retention rate on the revenue increments by provincial governments. As such, subsidy-receiving provinces have a 100% retention rate, similar to provinces that remit a fixed amount of their revenues to the central government. One may question the validity of such an approach. In model 3, we examine whether the estimates of model 1 remain the

TABLE 4
GROWTH RATE OF PER CAPITA GDP REGRESSIONS

VARIABLE	MODEL					
	1*	2†	3‡	4§	5	6
FD	.0372 (2.750)	.0503 (3.633)	.0217 (2.510)	.0315 (2.422)	...	.0254 (1.607)
FDAVG	...	...	...	...	.0119 (2.358)	.0082 (1.392)
HRS	.0387 (1.831)	.0411 (1.938)	.0374 (1.774)	.0379 (1.788)	.0397 (1.863)	.0389 (1.839)
GI	.0489 (3.865)	.0484 (3.858)	.0478 (3.822)	.0479 (3.829)	.0483 (3.854)	.0481 (3.848)
FISCAP	-.144 (-5.298)	-.147 (-5.398)	-.143 (-5.266)	-.143 (-5.267)	-.142 (-5.206)	-.145 (-5.338)
NSOESH	.145 (3.216)	.159 (3.433)	.138 (3.097)	.138 (3.087)	.155 (3.313)	.157 (3.386)
FPMP	.00974 (1.049)	.00948 (1.019)	.0105 (1.136)	.0106 (1.147)	.0103 (1.149)	.0101 (1.117)
POPSHR	.0417 (.593)	.0376 (.541)	.0426 (.601)	.0416 (.587)	.0390 (.551)	.0438 (.618)
TPOP	-.206 (-1.593)	-.208 (-1.611)	-.207 (-1.599)	-.206 (-1.589)	-.253 (-1.915)	-.243 (-1.819)
Adjusted R ²	.52	.52	.52	.52	.52	.52
Sample size	534	534	534	534	534	534

NOTE.—Province and year dummies are included in all models; estimates are corrected for heteroscedasticity according to Halbert White ("A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity," *Econometrica* 48 [May 1980]: 817–38); *t*-statistics are in parentheses; FDAVG = the average rate of budgetary revenues retained by provincial governments; otherwise, variables are as defined in table 2.

* FD is introduced as a lagged variable (by one period).

† FD is introduced as a lagged variable (by two periods).

‡ FD is introduced in log form.

§ FD is introduced in logistic form.

same when we distinguish between subsidy-receiving provinces and other provinces by introducing a dummy variable. The dummy variable, called *Subsidy*, equals one for subsidy-receiving provinces during the period 1985–93 and zero for all other provinces and for the rest of the sample period. The estimate for fiscal decentralization is reduced from 0.0362 to 0.0265 but remains statistically significant at the 1% level. The coefficient for the newly added dummy variable is positive and significant, indicating that, *ceteris paribus*, subsidy-receiving provinces grow at a faster rate. The estimates for all other variables are very similar to those of model 1. A second way to deal with the issue is to estimate model 1 using a subsample that excludes all subsidy-receiving provinces. We do this in model 4. These estimates are very similar to those in model 3 and are also in line with those in model 1, despite the almost 50% reduction in the sample size. There is no compelling evidence, therefore, against our treating subsidy-receiving provinces as having a 100% marginal revenue retention rate.

Another potential source of bias is that parameter values in the pre-reform period may be different from those in the reform period. In other words, the estimates may be sensitive to the inclusion of the data from the prereform years. In model 5, we report the results of the growth regression applied to the subsample that covers only the reform period 1979–93.²⁷ The estimate for FD remains statistically significant and is similar to its counterparts in models 3 and 4. The most noticeable change occurs in the estimate for the total population. Unlike in the previous models, this coefficient is positive and statistically significant, suggesting that larger provinces tend to grow faster than smaller ones. No appreciable changes occur in the rest of the estimates. There is no strong evidence, therefore, that our results are driven by the prereform subsample.

B. Robustness Tests for the Specification of Fiscal Decentralization Variable

It is conceivable that a substantial period of time may pass between the initiation of a reform measure and its final impact on the growth rate. To explore such a possibility, we specify the growth rate to be a function of the fiscal decentralization variable lagged by 1 or 2 years. The lag allows for the response time of the growth rate to changes in this reform measure. When the fiscal decentralization variable lagged by 1 year is used in model 1 of table 4, all estimates, especially the estimate for the fiscal decentralization, are remarkably similar to those of model 1 in table 3. In model 2 of table 4, the fiscal decentralization measure lagged by 2 years is introduced. Again, the results indicate that fiscal decentralization has had a positive impact on the rate of economic growth. The only discernible change is with respect to the size of the estimate associated with the fiscal decentralization variable, which is bigger than its counterparts in any of the models analyzed so far. It might be tempting for us to iden-

tify what the optimal lag structure is for this variable. However, the presence of high autocorrelation in the fiscal decentralization variable rules out a meaningful analysis of the distributed lag structure. Nevertheless, when we specify a lag structure that includes FD lagged by 1 year and 2 years, we obtain positive estimates for both of them, but the estimated standard errors become predictably larger because of the presence of multicollinearity.²⁸

So far, we have chosen the linear transformation of the marginal retention rate as our standard fiscal decentralization measure. However, it is possible that the relationship between the degree of fiscal decentralization and the growth rate is nonlinear. Therefore, to examine the robustness of our results to alternative specifications of fiscal decentralization, we rerun the regression model 1 of table 3 using a logarithm transformation and a logistic transformation of this variable.²⁹ The results are reported in models 3 and 4 of table 4. The estimates for FD are still positive and statistically significant. The estimate from the logarithm specification, 0.0217, implies that a switch from a centrally controlled fiscal system to a fully decentralized one should raise the rate of growth by about 10%. A similar interpretation obtains from the estimate pertaining to the logistic transformation of FD. The estimates for all other variables hardly change.³⁰

We next examine the robustness of our results to an alternative, but less pertinent, measure for fiscal decentralization. In model 5 of table 4, the average revenue retention rate is used.³¹ The results are generally consistent with the findings in the previous regression models. The only noticeable change is that the estimate for fiscal decentralization is much smaller than the estimates obtained from other models in which fiscal decentralization is defined as the marginal retention rate of budget revenue by a province. This indicates that the growth rate is more responsive to a change in the marginal retention rate than in the average retention rate. Put differently, two provinces that are allowed to keep the same proportion of their budget revenues may experience different growth rates of per capita GDP just because they are subject to different retention rates at the margin. In this case, the growth rate is higher in the province facing a higher marginal retention rate than in the one with a lower marginal retention rate. In fact, when we introduce both measures (the marginal and the average retention rates) in model 6 of table 4, the estimate associated with the marginal retention rate remains positive and significant at the 10% level, whereas the estimate for the average retention rate (albeit positive) loses significance. This may suggest that the marginal retention rate is a superior measure for fiscal decentralization. Furthermore, the estimate is larger for the marginal retention rate (0.0254) than for the average retention rate (0.0082), which is consistent with the results from the models where the two measures are introduced separately.

C. Testing the Exogeneity of the Fiscal Decentralization Measure

Although the results of our regression analysis show that fiscal decentralization is strongly associated with the growth rate of per capita GDP, it is arguable that the direction of causality may go from the latter to the former: poor provinces with low growth rates tend to be receivers of fiscal transfers from the central government whereas rich provinces with high growth rates are more likely to be given greater fiscal freedom. If this is the case, all our estimates will suffer from endogeneity bias and, hence, will be inconsistent. There are several indications, however, that fiscal decentralization is exogenously determined. First, we find that our measure for fiscal decentralization, FD, is quite stable. It assumes the value of zero in all provinces before 1985 and shows little within-province variation over time during the remainder of our sample period. The central-province fiscal arrangement was changed only once after it was first introduced in 1985. The adjustment was made in 1988 and was implemented accordingly until 1993, the last year of our sample period. Second, when we conducted a Hausman test of the potential endogeneity of the fiscal decentralization variable, we found that this test fails to reject the hypothesis that the marginal retention rate on budget revenue is exogenous to the model.³²

D. Investment and Other Dimensions of Fiscal Decentralization

In Section III, we argued that FD may raise the growth rate in two ways. First, fiscal decentralization can lead to an increase of capital investment at the provincial level, which, in turn, brings about economic growth. For provincial governments, the incentives to invest are stronger under a decentralized fiscal system than under a centralized one because the former affords provincial governments a greater share of returns that may be generated by additional investment. Indeed, if there exists a positive relationship between fiscal decentralization and the amount of provincial government investment, the estimates for fiscal decentralization reported in tables 3 and 4 would understate the total effect of fiscal decentralization on economic growth. We examine this issue through an independent regression analysis, in which GI is regressed against FD and other independent variables included in the growth regressions. The result shows that fiscal decentralization and investment are positively correlated. However, the correlation is not statistically significant.³³ Thus, based on our sample, there is no compelling evidence suggesting that fiscal decentralization promotes growth by raising total capital investment.

The second channel through which fiscal decentralization increases the growth rate is the enhancement of efficiency of resource allocations. As we have noted in Section I, provincial governments may have an informational advantage vis-à-vis the central government about local needs and, as a result, may be able to deliver public goods and services that are sensitive to local economic conditions. For example, a province can

increase its total output by allocating more resources or reallocating resources from low-productivity to high-productivity areas. It is important to note that such efficiency gains as a result of fiscal decentralization, similar to technological changes, can have long-lasting effects on the growth rate of per capita GDP. Our econometric model allows us to isolate such effects, and the estimation results show unequivocally that fiscal decentralization has made significant contributions to the rates of economic growth in Chinese provinces.

However, the paucity of relevant data precludes a detailed analysis of the way in which fiscal decentralization has brought about efficiency gains in China. Nevertheless, there is some evidence from aggregate provincial statistics suggesting that, in the wake of fiscal decentralization, provincial governments have allocated a bigger portion of their revenues to high-productivity areas. For example, we find a positive and significant association between the share of budgetary expenditure on infrastructure investment and the degree of fiscal decentralization.³⁴ One possible interpretation of this result is that provincial governments have tried to improve the efficiency of resource allocation by spending more on infrastructure, which increases the productivity of all other forms of capital, and less on low-productivity areas, such as the agricultural sector.³⁵ Perhaps the most telling evidence is the active involvement of county governments in the development of township and village enterprises (TVEs). Fiscal decentralization was not confined to central-provincial fiscal relations, and similar decentralized fiscal arrangements were introduced between provincial and county governments. This has changed the investment behavior of county governments, who now can keep a greater share of locally generated revenues. As a result, they have stronger incentives not only to invest more but also to invest more in the high-productivity rural industrial sector by building more TVEs. A fuller analysis of the role played by county governments is beyond the scope of the current study.³⁶

Our use of the marginal retention rate as a measure for fiscal decentralization is an improvement over the measures used in previous studies. However, it is not a perfect indicator. The level of fiscal decentralization also depends on the degree to which the central government can interfere in local governments' financial affairs through other channels. For example, the central government may grant a province some preferential policies, such as permitting it to set up special economic zones or granting it the power to approve investment projects. However, to the extent that such policies are province specific, their effects are captured by province dummies, which we have introduced in all the growth regressions.

VI. Conclusion

In this article, we investigate the effect of fiscal decentralization initiated in the mid-1980s in China on the growth rate of per capita GDP. We find

that fiscal decentralization has made a significant contribution to economic growth, which is consistent with the hypothesis that fiscal decentralization can increase economic efficiency. In addition, we find that rural reform, capital accumulation, and nonstate sector development were the key driving forces of the economic growth in China over the past 20 years or so.

These results allow us to draw two conclusions. First, and more general, is that institutional arrangements matter. Besides fiscal decentralization, other reforms (the household responsibility system in the rural sector and the "privatization" of the industrial sector by way of expanding the non-state-owned enterprises) have also been conducive to economic growth in China. Second, according to the data set, fiscal decentralization has raised the growth rate in China mainly by improving the efficiency of resource allocation rather than by inducing more investment.

It should be noted that the changes in the fiscal relationship between the central and provincial governments in China since the 1980s are much more intricate. The marginal rate of budget revenues retained by provincial governments, which we have adopted as the measure for fiscal decentralization in the empirical investigation, will not fully capture the intricacy. A better understanding of the factors and mechanisms that are crucial to the central-province negotiation process is important. For this reason, the results of this study should be viewed as tentative, and further investigation is most desirable.

Notes

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1. Wallace E. Oates, *Fiscal Federalism* (New York: Harcourt Brace Jovanovich, 1972). The efficiency gain argument is shared by many scholars, including Roy W. Bahl and Johannes F. Linn (*Urban Public Finance in Developing Countries* [New York: Oxford University Press, 1992]); and Richard M. Bird ("Threading the Fiscal Labyrinth: Some Issues in Fiscal Decentralization," *National Tax Journal* 46 [June 1993]: 207–27).

2. See, e.g., Anwar Shah and Zia Qureshi, "Intergovernmental Fiscal Relations in Indonesia," Discussion Paper no. 239 (World Bank, Washington, D.C., 1994).

3. Yingyi Qian and Gerard Roland, "The Soft Budget Constraint in China," *Japan and the World Economy* 8 (June 1996): 217–23.

4. See, e.g., Robert J. Barro, "Government Spending in a Simple Model of Endogenous Growth," *Journal of Political Economy* 98 (October 1990): S103–S125; Dale W. Jorgenson and Kun-Yong Yun, "Tax Reform and U.S.

Economic Growth," *Journal of Political Economy* 98 (October 1990): S151–S193; Robert G. King and Sergio Rebelo, "Public Policy and Economic Growth: Developing Neoclassical Implications," *Journal of Political Economy* 98 (October 1990): S126–S150.

5. Wallace E. Oates, "Fiscal Decentralization and Economic Development," *National Tax Journal* 46 (June 1993): 237–43; Zhiqiang Liu, "Fiscal Decentralization and Rural Growth" (National University of Singapore, East Asian Institute, 1997, mimeographed).

6. Obviously, whether there is any significant efficiency gain associated with fiscal decentralization cannot be settled on theoretical grounds alone. The issue must be subject to rigorous empirical tests. There are also cautionary arguments against fiscal decentralization on other grounds, ranging from macroeconomic control to corruption at lower levels of government. Remy Prud'homme ("The Dangers of Decentralization," *World Bank Research Observer* 10 [August 1995]: 210–26) presents an elaborate discussion of the arguments.

7. Dwight H. Perkins, "Reforming China's Economic System," *Journal of Economic Literature* 26 (June 1988): 601–45.

8. Tao Zhang and Heng-fu Zou, "Fiscal Decentralization, Public Spending, and Economic Growth in China," *Journal of Public Economics* 67 (February 1998): 221–40; Jun Ma, "China's Economic Reform in the 1990s" (International Monetary Fund, Washington, D.C., 1997). There are quite a number of nonquantitative studies addressing various aspects of fiscal systems in China. See, e.g., Christine P. W. Wong, "Central-Local Relations in an Era of Fiscal Decline: The Paradox of Fiscal Decentralization in Post-Mao China," *China Quarterly* 128 (December 1991): 691–715, and "Fiscal Reform and Local Industrialization," *Modern China* 18 (April 1992): 197–227; Yingyi Qian and Barry R. Weingast, *China's Transition to Markets: Market-Preserving Federalism, Chinese Style* (Stanford, Calif: Hoover Institution on War, Revolution, and Peace, Stanford University, 1995).

9. For a detailed discussion on China's fiscal system before the reforms, see Nicholas Lardy, "Centralization and Decentralization in China's Fiscal Management," *China Quarterly* 61 (March 1975): 26–60; Michel Oksenberg and James Tong, "The Evolution of Central-Provincial Fiscal Relations in China, 1971–1984: The Formal System," *China Quarterly* 125 (March 1991): 1–32; Christine P. W. Wong, Christopher Heady, and Wing T. Woo, *Fiscal Management and Economic Reform in the People's Republic of China* (London: Oxford University Press, 1995); and Justin Yifu Lin, Zhiqiang Liu, and Funning Zhong, "Fiscal Decentralization and Rural Development in China" (World Bank, Washington, D.C., 1997). The last two also contain a detailed account of the fiscal reforms from the early 1980s to the early 1990s.

10. Central fixed revenues were specified as income and adjustment taxes collected from centrally owned state enterprises; business taxes collected from the rail, civil aviation, telecommunications, and financial sectors; revenues remitted by national defense industries; special taxes on petroleum fuel; customs duties; turnover and income taxes and use-right fees collected from off-shore petroleum joint ventures; and treasury bonds and special levies for energy and transportation development. From the turnover taxes collected from enterprises under the Ministry of Petroleum, the Ministry of Electricity, the Petrochemical Corporation, and the Nonferrous Metal Corporation, 70% were assigned to the central budget. Local fixed revenue included income and adjustment taxes and contract fees collected from locally owned state enterprises; collective enterprise income tax; agricultural taxes; vehicle and ship license fees; urban real property tax; livestock transaction tax; country fair transaction tax; deed fees; and 30% of turnover taxes collected from enterprises. Central-local shared revenues included

turnover taxes (product, value-added, and business taxes), except those specified as central or local fixed revenues; resource taxes; construction taxes; salt taxes; personal income taxes; the tax levied on state enterprises' bonus payments; and turnover and income taxes collected from joint ventures excluding off-shore petroleum firms.

11. Gregory N. Mankiw, David Romer, and David N. Weil, "A Contribution to the Empirics of Economic Growth," *Quarterly Journal of Economics* 107 (May 1992): 407-37.

12. Justin Yifu Lin, "Rural Reforms and Agricultural Growth in China," *American Economic Review* 82 (March 1992): 34-51.

13. Variables measured in percentage are introduced into the regression equation as level variables, whereas POPT and FISCAP are in log form. It should be noted that such a specification is adopted to facilitate the interpretation of the estimates and has no bearing on the conclusion of the article.

14. See Section V.

15. Hainan and Xizan are excluded because the data are incomplete.

16. China Statistical Bureau, *The Gross Domestic Product of China, 1952-1995* (Liaoning: Northeast University of Finance and Economics Press, 1997).

17. China Statistical Bureau, *Compilation of Historical Statistics for Each Province, Autonomous Region, and the Directly Administered Municipalities, 1949-1989* (Beijing: Statistical Publishing House, 1990), and *Statistical Yearbook of China* (Beijing: Statistical Publishing House, 1986-94).

18. China Statistical Bureau, *Price Statistical Yearbook of China* (Beijing: Statistical Publishing House, various years).

19. See Lin.

20. See authors cited in n. 8 above.

21. *Ibid.*

22. See, e.g., Wong, "Central-Local Relations in an Era of Fiscal Decline."

23. Sharing rules in this category are (1) remitting a share of local revenue in the base year and the total remittance increases at a predetermined rate in the subsequent years, (2) remitting a fixed amount of the revenues to the central government, (3) remitting a fixed amount in the base year and the total remittance increases at a predetermined rate in the subsequent years, (4) receiving a fixed amount of subsidy from the central government, and (5) receiving a fixed amount of subsidy in the base year and the total subsidy increases at a predetermined rate in the subsequent years.

24. See Section II.

25. In addition, the Durbin-Watson tests revealed no evidence that the true error disturbances are autocorrelated in any of the models reported in the tables or discussed in the text.

26. Herbert White, "A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity," *Econometrica* 48 (May 1980): 817-38.

27. An alternative way to address the issue is to test the stability of the parameters in the growth equation between the prereform and reform periods. However, because FD and HRS assume the value of zero during the prereform period, the Chow's test is not feasible.

28. We also conducted regression analyses in which HRS is introduced in lag forms. The results are not sensitive to alternative specifications of the lag structure for this variable.

29. For a general logistic function, $FD = \{1 + \exp[(-X + a)/k]\}^{-1}$, the mean is a , and the standard deviation is $k\pi/3^{0.5}$. We assign the inflection point of the function to 50% marginal retention rate (i.e., $a = 0.5$) and set the standard

deviation to 0.25 so that the marginal retention rate variable (X) falls within 2 standard deviations of the mean.

30. In principle the same specification issue applies to HRS. We focus on testing the robustness of the estimate associated with FD to alternative specifications because fiscal decentralization is the central concern of the study. However, when HRS is also introduced in log or logistic form, its estimated coefficient, as well as that of FD, remains positive and statistically significant.

31. See our criticism in the previous section of the average revenue retention rate.

32. We also tested the exogeneity of HRS jointly with FD. A Hausman test revealed no strong evidence that HRS and FD should be treated as endogenous variables.

33. The regression model (province and time dummies are included but not shown) and results are: $GI = 0.00245 (0.038) * FD + 0.0247 (0.317) * HRS - 0.0834 (-0.875) * \ln(FISCAP) - 0.0451 (-0.242) * NSOESH + 0.00369 (0.091) * FPMP - 0.0388 (-0.148) * POPSHR - 0.580 (-1.768) * \ln(POPT)$, where the numbers in parentheses are t -statistics and all variables are as defined in table 2. The adjusted $R^2 = 0.41$. Furthermore, the relationship between GI and FD appears to be insensitive to alternative regression specifications. For example, the estimated coefficient for FD remains positive and insignificant in a simple regression of GI against FD.

34. The regression model (province and time dummies are included but not shown) and results are: $BESHINF = 0.0486 (3.033) * FD - 0.0569 (-3.401) * HRS + 0.0249 (2.694) * GI + 0.119 (5.371) * \ln(FISCAP) - 0.138 (-3.794) * NSOESH - 0.00344 (-0.398) * FPMP - 0.132 (-1.981) * POPSHR - 0.419 (-0.510) * \ln(TPOP)$, where BESHINF is the share of budgetary expenditure on infrastructure investment, the numbers in parentheses are t -statistics, and explanatory variables are as defined in table 2. A simple regression of BESHINF against FD yields an estimate of 0.0655 for FD with a t -statistic of 3.986.

35. The relationship between the shares of budgetary expenditure on agriculture related activities and fiscal decentralization is statistically insignificant, albeit positive.

36. There is some preliminary evidence that suggests a positive linkage between the development of TVEs and fiscal decentralization. When we regress provincial per capita TVE investment on our fiscal decentralization measure and other control variables, we obtain a positive estimate for FD. However, the estimate is not statistically significant.

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