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FISCAL STRUCTURES AND REGIONAL ECONOMIC GROWTH: EVIDENCE FROM CHINA'S FISCAL CONTRACT SYSTEM

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ABSTRACT

This paper sets out to examine the impact of the fiscal contract system on economic growth in China's different provinces. Empirical testing is conducted using the error components model and pooled cross-section (provinces) and time-series data from 1989 to 1993. The empirical results for the whole sample show an inclination towards convergence of regional economic growth, with any increase in regional tax revenue hindering investment and employment due to excessive taxation, which is unfavorable to economic growth. The same finding applies to extra-budgetary revenue. Ranked by their overall strength, the provinces are divided into economically advanced and backward groups for empirical testing. Comparison of the empirical results using a sample of the top and bottom fifteen, in terms of their overall strength, reveals that the economic growth of the top fifteen provinces tends to be divergent. More fiscal revenue and extra-budgetary funds are unfavorable to economic growth and the results are the same for all provinces; the result also remains the same when fiscal revenue is itemized. The difference between the two lies in fiscal expenditure.

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INTRODUCTION

The main characteristics of a classic centrally planned economy are public ownership of property rights and the control over both politics and the economy being exercised by one political party. Society can be likened to an enormous factory with the government at the head, whose overall functions encompass production, consumption, circulation and distribution activities. The government's functions therefore supersede those of the market mechanism, actively intervening in economic activities and amplifying the role that it plays. The objectives of China's fiscal policies reflect the expansion of the government's functions, with the principal objectives being mainly financing government expenditure, the distribution of government revenues, raising funds, the efficient allocation of resources and ensuring the steady growth of the economy.

Prior to the institutional transformations which began in 1979, China had adopted a fiscal system based on 'unified revenue and expenditure' (*tongshou tongzhi*). People were forced to save through low wages, and most taxes and enterprise profits were submitted to the central government which then appropriated what it had received to provide for the fiscal needs of provinces, municipalities and autonomous regions based on economic arrangements. Under the unified revenue and expenditure fiscal system, government rationing replaced the market mechanism, with the fixed assets and working capital required by enterprises being funded gratis

by the government, which also took care of enterprises' losses and outstanding bank loans. Excessive human intervention, coupled with erroneous information, tended to aggravate the increasingly complex economic situation and was unfavorable to economic development, thereby leading to government failure. Such government failure included the uncorrected parts of market failure and inefficient resource allocation due to active government intervention (Krueger, 1990).

Following the economic reforms, China's planned economy has been undergoing a gradual process of transformation into a market economy, with the system evolving from the unified revenue and expenditure system, to a 'fiscal contract system' (*caizheng baoganzhi*), and then to a 'tax assignment system' (*fenshui zhi*).[1] Under the fiscal contract system, competition was the driving force behind resource allocation amongst the different regions, with bureaucrats at all levels actively carrying out reforms that would facilitate local economic growth, since market reforms were considered to be the source of their own benefits.

Ever since the economic reforms began, China has kept its economy growing at a rapid pace; thus the question of whether the changes to the fiscal system have impacted on regional economic growth during the overall process of institutional transformation seems worthy of exploration. The literature concerning empirical testing of fiscal expenditure and economic growth has focused on testing Wagner's Law, i.e., government fiscal expenditure increases with the growth of an economy (Bird, 1971); this argument is, however, still inconclusive. The extant literature can be grouped into two groupings. One has used Granger causality test technique (e.g., Singh and Sahni, 1984; Ram, 1986), the other has utilized cointegration and error correction model (e.g., Islam, 2001; Chang, 2002). Nevertheless, the different econometric techniques sometimes yield different empirical results. The study by Singh and Sahni (1984) focusing on India over the period 1950-1981, demonstrated that there was a two-way relationship between fiscal expenditure and national income, whilst in an empirical study conducted by Ram (1986), using data obtained from 63 countries between 1950 and 1980, the findings showed that only around a third of the countries passed Wagner's hypothesis.

Despite the recent development and application of the cointegration approach, there is continuing variance as to whether Wagner's hypothesis holds from country to country. Henrekson (1993) demonstrated the lack of a cointegration relationship between government expenditure and economic growth using data on Sweden covering the period from 1961 to 1990. Murthy (1993, 1994) used data on Mexico covering the periods 1950-1980 and 1950-1988 to test Wagner's hypothesis, with the results supporting Wagner's Law; however, when exercising the cointegration approach and using the same data, Ashworth (1994) obtained contrary results. Using data on Greece from 1951 to 1992, Hondroyiannis and Papapetrou (1995) discovered that it did not support Wagner's Law.

Empirical analyses supporting Wagner's Law include Abizadeh and Gray (1985), and Bohl (1996). Using data from the developed countries in the post World War Two era, these studies showed that the data on Canada and England supported Wagner's Law. Payne and Ewing (1996) examined 22 countries, amongst which, the data on Australia, Columbia, Germany, Malaysia, Pakistan and the Philippines all supported Wagner's Law. Kolluri and Panik (2002) examined data on the G7 countries between 1960 and 1993, with the results also supporting Wagner's Law. Islam (2001) used data on the US between 1929 and 1996 and showed that a long-run equilibrium relationship existed between per capita real income and the relative size of government, thus supporting Wagner's hypothesis. Chang (2002) examined three rapidly developing newly industrialized economies – South Korea, Taiwan and Thailand – along with three industrialized countries – Japan, the US and the UK – from 1951 to 1996. In their study, a long-run equilibrium relationship between national income and government expenditure could be identified in every case except Thailand.

The literature touching upon the impact of fiscal expenditure or tax revenue on economic growth includes Barth, et al. (1990), Easterly and Rebelo (1993) and Fischer (1993). However, the empirical evidence showed no consensus amongst them

(Martinez-Vazquez and McNab, 2003). The literature with regard to the impact on economic growth stemming from the change to the fiscal system, as China transformed itself from a planned economy towards a market economy, includes Zhang and Zou (1998), which used data from China's 28 provinces between 1986 and 1992 and found that fiscal decentralization had a negative impact on economic growth; however, Lin and Liu (2000) had contrary findings, concluding that fiscal decentralization had a positive impact on economic growth in China. Chen (2004) indicated that an increase in China's fiscal decentralization leads to a higher level of provincial expenditure. As can be seen from the brief review of the empirical findings, the lack of consensus could stem from differences in econometric methods employed by the researchers; for example, Zhang and Zou (1998) utilized random effect estimation with the generalized least squares (GLS) regression. Lin and Liu (2000) used the fixed effect model. A random effect model was also employed by Chen (2004).

The empirical literature referred to above use advanced or developing countries as the research subjects; however, no research on the same issue was ever conducted on economies going through an institutional transformation. The aforementioned literature exploring the impact of China's fiscal system did not examine the impact of the fiscal structure has on regional economic growth, particularly at provincial level. Since provinces tried hard to balance their budgets under the fiscal contract system, when establishing empirical models, it is necessary to take into account the uniqueness of China's fiscal system without ignoring government budget constraint, as suggested by Christ (1968, 1979). Miller and Russek (1997a, b) recently examined the impact of fiscal structure on economic growth taking budget constraint into consideration, and found that when developing countries financed government expenditure with bonds, this had a negative impact on economic growth.

In addition to the government budget constraint that is inherent in China's fiscal system, under the fiscal contract system different provinces had different tax incentives and fiscal expenditure structures which influenced both the capital accumulation in the provinces as well as labor movement between them. This in turn influenced their economic growth. Therefore, empirical models also have to take into account the conditional convergence hypothesis (Miller and Russek, 1997a, b). With regard to the ways that the differences in tax incentives and fiscal expenditure structures amongst provinces impact on provincial economic growth, the empirical models of Helms (1985) and Mofidi and Stone (1990) considered the impact that taxes have on labor supply and cost function, and suggested that high taxes impede the establishment of new businesses and the expansion of existing ones, which in turn demotivates work and investment, and is harmful to economic growth. On the other hand, if fiscal expenditure helps to attract businesses, encourage labor movement and capital accumulation, then it will also help to promote economic growth.

The main purpose of this paper is therefore to examine the impact that the evolution of China's fiscal contract system has had on regional economic growth using pooled cross-section and time-series data to observe the period between 1989 and 1993. China's huge size means that economic development and fiscal scale vary enormously between the different provinces/regions; therefore, these provinces (including municipalities and autonomous regions) are sorted according to their overall strength, and then divided into two groups for comparison.

The remainder of this paper is composed as follows. The next section describes the evolution of the fiscal contract system and its impact on the behavior of local governments. This is followed by the establishment of the empirical model based on the characteristics of the fiscal contract system, and thereafter, by the analysis of the empirical results. The paper closes by outlining the conclusions drawn from this study.

THE EVOLUTION OF THE FISCAL CONTRACT SYSTEM

The fiscal contract system was established in 1980 and abolished in 1993, with its implementation between 1980 and 1984 demarcating the scope of local fiscal revenue and expenditure, and determining the contractual basis for both. Local governments were responsible for balancing their own budgets; thus, the more revenue they collected the more they could spend, and vice versa. Regional fiscal revenues include fixed fiscal revenue, fixed-percentage shared revenue and adjustment revenue. Fixed fiscal revenues include operating income from regionally-owned enterprises, salt tax, husbandry taxes, industrial and commercial tax, local taxes and other local income. Fixed-percentage shared revenues are revenues that are shared by local and central governments, with the former taking 20 per cent and the latter, 80 per cent. Adjustment revenues are calculated by multiplying product tax, appreciation tax and value-added tax (VAT) by a predetermined weight.

Regional fiscal expenditure includes regionally financed investments in basic infrastructure; working capital for regionally-owned enterprises; expenditure in support of agricultural production; operating expenses for agriculture, forestry, water conservancy, meteorology, industry, communication, business, culture and education, sanitation and science; city upkeep outlays; social benefit payments; administrative expenses; and so on. Judging from the projected fiscal revenue and expenditure for 1979, if regional fiscal expenditure was greater than combined fixed fiscal revenue and shared revenue, but less than aggregate regional fiscal revenue, both fixed fiscal revenue and shared revenue remained within the region. If regional fiscal expenditure was greater than regional fiscal revenue, then the central government would subsidize a certain amount.[2]

A refined fiscal contract system was adopted between 1985 and 1987. Under this new system, government fiscal revenue fell into three categories, central government fixed fiscal revenue, regional government fixed fiscal revenue and their shared revenue. An expenditure base was estimated according to the region's financial resources. After taking into account fixed and shared revenue for the region, percentage shares were then determined. In 1985, the respective percentage shares for Beijing, Tianjin, Shanghai, Hebei, Shanxi and Liaoning were 49.55 per cent, 39.45 per cent, 23.54 per cent, 69.10 per cent, 97.50 per cent and 51.08 per cent.

Four different fiscal contract system programs were adopted in different regions in 1985: (i) 'total amount sharing' was implemented in fifteen provinces including Beijing, Tianjin, Shanghai, Hebei, Shanxi, Liaoning, Heilongjiang, Jiangsu, Zhejiang, Anhui, Shandong, Henan, Hunan, Hubei and Sichuan;[3] (ii) a 'fixed amount subsidy' was adopted in Shaanxi, Gansu, Jilin and Jiangxi provinces; (iii) an 'ethnic fiscal system with fixed amount subsidy' was adopted in Inner Mongolia, Xinjiang, Tibet, Guangxi, Ningxia, Yunnan, Guizhou and Qinghai; and (iv) a 'major fiscal contract system' was implemented in Guangdong and Fujian.

Due to its failure to motivate the regions to submit more to the central government, total amount sharing was modified in 1988 by categorizing several other types of taxes as regional fixed revenue those that were small in amount and the sources of which were widely scattered, and then implementing various forms of the fiscal contract system to ensure the growth of both submitted and regionally retained revenues. The details were as follows:

(i). Beijing, Hebei, Liaoning, Shenyang, Haerbin, Jiangsu, Zhejiang, Ningbo, Henan and Chongqing adopted an 'incremental revenue contract'.
(ii). Tianjin, Shanxi and Anhui adopted 'total amount sharing'.
(iii). Dalian, Qingdao and Wuhan adopted 'total amount sharing plus incremental sharing'.
(iv). Hunan and Guangdong adopted an 'incremental submitted amount contract'.
(v). Shanghai, Shandong and Heilongjiang adopted 'submitting a fixed amount'.

(vi). Inner Mongolia, Guangxi, Tibet, Ningxia, Xinjiang, Guizhou, Yunnan, Qinghai, Jilin, Jiangxi, Shaanxi, Gansu, Fujian, Hainan, Hubei and Sichuan adopted a 'fixed amount subsidy'.

The fiscal contract system implemented between 1980 and 1993 broke away from the traditional unified revenue and expenditure framework, granting regional governments more financial resources to promote the growth of the regional economy with regional governments being requested to balance their own budgets. It was impossible to finance regional expenditure through the issuing of bank notes or government bonds; thus, the main sources of fiscal revenue came from taxes levied on manufacturing and business activities. Only through taxation could regional fiscal expenditure be financed. In other words, regional governments did their best to increase tax revenues (Jin, et al., 2005). Once regional revenue increased, financing could be provided for regional fiscal expenditure to promote the development of the regional economy.

Under the fiscal contract system, competition was the driving force in resource allocation between regions; however, regional governments encountered a number of difficulties in the process of maximizing their tax revenue. First of all, industrial policies did not achieve the goal of bringing about the comparative advantage of different regions. Instead, regions competed in developing industries which had a high tax rate applied to them and had low investment requirements. This resulted in a concentration on similar industries for regional economies (Han and Zhang, 1995). Secondly, the fiscal contract system was a joint effort on the part of the central and regional governments intended to reduce the tax burden of citizens; however, the system also led to a sharp fall in the government's tax revenue (Jiang, 1996). Thirdly, the complexity of the system was the result of a bargaining process between central and regional governments. There was therefore a high level of instability in the distribution of financial resources between the two (Ma, et al., 1997).

1994 saw a turning point in China's fiscal system reform. Borrowing from fiscal federalism, the regional fiscal contract system was replaced by a 'tax assignment system', the purposes of which were to stabilize the central government's budgetary revenue and raise the proportion of its fiscal revenue, to redefine revenue distribution between central and regional governments, and to dispose of the phenomena of duplicated construction in different regions. Under the new system, the share of GNP accounted for by fiscal revenue rose from 14.5 per cent in 1991, to 25 per cent in 2000, whilst the share of gross fiscal revenue allocated as central government revenue also rose to 60 per cent in 2000.

THE EMPIRICAL MODEL

In order to examine the impact of China's fiscal contract system on regional economic growth, the proposition for establishing the model is the conditional convergence hypothesis suggested by Barro (1991), Barro and Sala-i-Martin (1992), Mankew, et al. (1992) and Sala-i-Martin (1996). Additional fiscal structure variables are incorporated into the model as control variables to determine the effects of fiscal structure on regional economic growth. Since institutional transformation began, under the fiscal contract system, different provinces had different tax incentives and fiscal expenditure structures, thus influencing their capital accumulation and labor movement, which in turn influenced their economic growth (Miller and Russek, 1997a, b; Kneller et al., 1999; Lee and Gordon, 2005).

China's regional economic growth rate is determined as follows:

$$pg_{it} = \ln py_{it} - \ln py_{it-1} \quad (1)$$

where pg = the real growth rate of provincial per capita income; py = provincial real per capita income; $i = 1,2,3,....$ represents provincial cross-section data; and $t = 1,2,3,....$ represents provincial time-series data.

Assuming $X_{it} = (X_{it}^1, X_{it}^2, X_{it}^3, \ldots\ldots X_{it}^n)$ represents the initial condition, fixed asset investment, fiscal revenue and fiscal expenditure modes; these variables will influence provincial capital accumulation and labor movement, which in turn will influence economic growth. Therefore, the regional growth pattern is determined as follows:

$$pg_{it} = \alpha + \sum_{k=1}^{n} \beta_k X_{it}^k + \varepsilon_{it} \tag{2}$$

$$\varepsilon_{it} = \mu_i + \upsilon_t + \omega_{it} \tag{3}$$

where $\mu_i \sim N(0, \sigma_\mu^2)$ is cross-section disturbance; $\upsilon_t \sim N(0, \sigma_\upsilon^2)$ is time-series disturbance; and $\omega_{it} \sim N(0, \sigma_\omega^2)$ is pooling disturbance.

Assuming that these disturbances are not correlated and that there is no autocorrelation, the following conditions are satisfied:

$$\mathrm{Cov}(\mu_i, \upsilon_t) = \mathrm{Cov}(\mu_i, \omega_{it}) = \mathrm{Cov}(\upsilon_t, \omega_{it}) = 0$$

$$\mathrm{Cov}(\mu_i, \mu_j) = 0 \quad i \neq j$$

$$\mathrm{Cov}(\upsilon_t, \upsilon_{t'}) = 0 \quad t \neq t'$$

$$\mathrm{Cov}(\omega_{it}, \omega_{jt}) = 0 \quad i \neq j$$

$$\mathrm{Cov}(\omega_{it}, \omega_{it'}) = 0 \quad t \neq t'$$

$$\mathrm{Cov}(\omega_{it}, \omega_{jt'}) = 0 \quad i \neq j \quad t \neq t'$$

The following is obtained by substituting (3) into (2):

$$pg_i = \alpha + \sum_{k=1}^{n} \beta_k X_{it}^k + \mu_i + \upsilon_t + \omega_{it} \tag{4}$$

The residual consists of three types of variance: $\mathrm{Var}(\varepsilon_{it}) = \sigma_\mu^2 + \sigma_\upsilon^2 + \sigma_\omega^2$

Given that one of the characteristics of China's planned economy since the start of the reforms has been considerable extra-budgetary revenue (Eckaus, 2003), this revenue is thus taken into account in the empirical testing. Consideration is also given to government budget constraint with regard to financing provincial expenditure with taxes (Christ, 1968, 1979). The model is then as follows:

$$pg_{it} = a_0 + a_1 \ln py_{i1988} + a_2 FAI_{it} + a_3 TR_{it} + a_4 TE_{it}$$
$$+ a_5 EBR_{it} + a_6 SUR_{it} + \varepsilon_{it} \tag{5}$$

The provincial retail price index (1981 = 100) is used as the price deflator when calculating the real term of provincial real per capita income. py_{i1988} stands for

provincial initial condition, denominated by real per capita income in 1988; FAI stands for the ratio of provincial fixed assets investment to provincial national income; TR represents the ratio of provincial total fiscal revenue to provincial national income; TE stands for the ratio of provincial total fiscal expenditure to provincial national income; EBR represents the ratio of provincial extra-budgetary revenue to provincial national income; and SUR stands for the ratio of provincial fiscal surplus to provincial national income.

The provincial total fiscal revenue and expenditure shown in Equation (5) can be further subdivided by its structure with the regression model as follows:[4]

$$pg_{it} = b_0 + b_1 \ln py_{i1988} + b_2 FAI_{it} + b_3 RA_{it} + b_4 RB_{it} + b_5 EA_{it} + b_6 EB_{it} + b_7 EBR_{it} + b_8 SUR_{it} + \varepsilon_{it} \quad (6)$$

RA stands for the ratio of provincial Category 1 fiscal revenue to provincial national income. Category 1 fiscal revenue includes product tax, value-added tax, business tax, agricultural tax, farmland occupation tax, energy and transportation fund tax and revenue raised from the budget adjustment fund. RB stands for the ratio of provincial Category 2 fiscal revenue to provincial national income. Category 2 revenue covers state-owned enterprises' (SOEs) income tax, SOEs' adjustment tax, SOEs' profit remittance and subsidies for planned losses. EA stands for the ratio of provincial Category 1 fiscal expenditure to provincial national income. Category 1 fiscal expenditure comprises of capital construction, innovation enterprises, science and technology promotion, support for agricultural production, the operating expenses of industry departments, commerce and transportation, operating expenses for agriculture, forestry, water conservancy, meteorology, culture, education, health, science, welfare assistance, administrative overheads, the public security agency, the procurator agency and the court of justice. EB stands for the ratio of provincial Category 2 fiscal expenditure to provincial national income. Category 2 fiscal expenditure entails price subsidies.

If the initial condition coefficients a_1 and b_1 of Equations (5) and (6) turn out negative, the conditional convergence hypothesis is borne out, otherwise it is not. The implication of the conditional convergence hypothesis is that those provinces with a low level of initial real per capita income are expected to grow at a faster pace than those with higher levels, whilst fixed asset investment is expected to have a positive impact on economic growth.

In addition to testing the validity of the conditional convergence hypothesis, in the empirical analysis, we also consider what implications the fiscal structure variables have in Equations (5) and (6). With respect to Equation (5), due to government budget constraint, only two of the three coefficients of revenue, expenditure and surplus need to be estimated; therefore, the surplus variable is ruled out. That means that if expenditure remains unchanged, the coefficient a_3 can be used to measure the impact which increased revenue has on economic growth. In other words, high taxes will make people less willing to work and invest, which is unfavorable to economic growth. By the same token, if revenue remains unchanged, the coefficient a_4 can be used to measure the impact that increased expenditure has on economic growth; however, if revenue remains unchanged, government bonds will have to be issued to finance expenditure. In China, bonds are issued by central government, not regional government, and under the fiscal contract system, when regional government was poorly financed, central government would provide subsidies. Therefore, the budget deficit was made up by a central subsidy rather than by the use of bonds.

Equation (6) is similar to Equation (5), in that it also tests the validity of the conditional convergence hypothesis. Equation (6) also subdivides expenditure and revenue into several categories. Interpretation of the estimated coefficient is the same as that in Equation (5), with the aim being to assess the impact on the regional economic growth of the various items of revenue and expenditure.

EMPIRICAL RESULTS

Pooled cross-section and time-series data were employed to examine the impact that China's adoption of the fiscal contract system had on regional economic growth. Although the system was introduced in 1980, because of the lack of data, our study covers only the period between 1989 and 1993, there are 150 observations in the data set. Given its huge size, China's geography varies from one province to another, as do their natural resources, human resources, capital stock, technology, production capacity and economic efficiency. This has led to significant differences in the level of economic development achieved in the different provinces. Ranked by their overall strength indicators, the provinces are divided into economically advanced and backward groups to facilitate testing and comparison. Overall strength represents development potential based upon economic, technological, social and natural resource indicators. Economic strength indicators include the level of economic development, production capacity, capital supply capabilities, key production elements supply capabilities and economic efficiency. In terms of overall strength, the top fifteen provinces were Liaoning, Guangdong, Shanghai, Jiangsu, Shandong, Beijing, Sichuan, Hubei, Heilongjiang, Zhejiang, Hebei, Henan, Tianjin, Hunan and Shaanxi, with the bottom fifteen being Anhui, Jilin, Fujian, Shanxi, Yunnan, Inner Mongolia, Xinjiang, Guangxi, Jiangxi, Gansu, Guizhou, Qinghai, Ningxia, Hainan and Tibet.

Empirical data were extracted from various issues of *Statistical Yearbook of China 1990-1994*, *Finance Yearbook of China 1993-1994*, and *China Finance Statistics 1950-1991*. Due to the use of pooled data, the fixed effects model can only analyze the effects of observed samples within certain confines. China's huge size and the idiosyncrasies of its constituents make it difficult to quantify the data collected when measuring the geographical, social, institutional and economic ingredients of the provinces. Moreover, the use of dummy variables will lessen the degree of freedom and affect the efficiency of the estimation. In addition, the results of the dummy variables are difficult to interpret.

Mundlak (1975) noted that individual effects could be considered random, and for this reason, empirical testing adopted the error components model or random effects model. The Da Silva error components test technique assuming individual effects as random is therefore used to estimate the model. The Da Silva method estimates the regression parameters using a two-step generalized least squares (GLS)-type estimator (Drummand and Gallant, 1992). An alternative procedure is to estimate the fixed effects model, but the results of the fixed effects model do suffer the problem of heteroscedasticity. Sensitivity tests are further used to develop a more robust set of empirical results (Levine and Renelt, 1992). According to these sensitivity tests, if the coefficients are not sensitive to the inclusion of different variables, e.g., the coefficients do not change signs or become insignificant, the variables can robustly affect the dependent variable.

Only the results of the error components model are presented, with the empirical model consolidating cross-section and time-series data. The residual may thus include disturbances from cross-section data, or time-series data, or both. Consequently, the null hypothesis of the model specification is valid can be tested by deciding if homoskedasticity exists using Breusch and Pagan's (1980) Lagrange multiplier (LM) statistics test. In addition, correlation coefficients are used to determine whether multi-collinearity exists amongst the independent variables.

The empirical results using all provinces as the sample are shown in Tables 1 to 4. The respective LM statistics of Tables 1 and 3 are 0.885 and 0.06; both are smaller than the critical value of chi-square distribution, at 6.63, with a significance level of 1 per cent and a degree of freedom of 1. The model thus possesses homoskedasticity with no specification error. In addition, the correlation coefficients of the independent variables, listed in Table 2, are between -0.25 and 0.1830, whilst those listed in Table 4 are between -0.3217 and 0.5963. Therefore, multi-collinearity does not exist between the two sets of independent variables.

TABLE 1 EMPIRICAL RESULTS (ERROR COMPONENTS MODEL) FOREQUATION (5) FOR ALL SAMPLES

Independent Variable	
ln py	-0.1654 (0.0436)**
FAI	0.5024 (0.0051)**
TR	-0.8846 (0.0049)**
TE	-0.5248 (0.0154)**
EBR	-1.1914 (0.0174)**
Root MSE	24.3855
Breusch-Pagan Test Lagrange Multiplier Statistic	0.885

Notes: **Indicates significance at the 1 per cent level; values in parentheses are standard deviations.

TABLE 2 CORRELATION COEFFICIENTS OF INDEPENDENT VARIABLES FOR EQUATION (5) FOR ALL SAMPLES

	py	FAI	TR	TE	EBR
Py	1.000	-0.0104	0.0236	0.0302	-0.0155
FAI	-	1.0000	-0.0787	-0.1186	-0.1202
TR	-	-	1.0000	0.1830	-0.0136
TE	-	-	-	1.0000	-0.2500
TBR	-	-	-	-	1.0000

As shown in Table 1, the estimated coefficient of initial condition (ln py) is negative with a 1 per cent significance level, suggesting verification of the conditional convergence hypothesis; that is, the differences in economic growth are moving towards convergence for every province. The poor provinces are trying to catch up with their richer counterparts through growth at a much more rapid pace. The estimated coefficient of *FAI* is positive with a significance level of 1 per cent; that is, an increase in fixed assets is favorable to regional economic growth. The estimated coefficient of *TR* is negative with a significance level of 1 per cent. Under the fiscal contract system, provinces tried hard to balance their budgets and were allowed to seek new financial resources to increase their tax revenues. If expenditure remained unchanged, provinces could submit more to the central government and keep more for themselves when revenue increased; however, excessive taxation hinders employment and investment, and is unfavorable to economic growth. The estimated coefficient of *TE* is negative with a significance level of 1 per cent. Since provincial governments did not have the authority to issue bonds, they had to rely on central subsidies if revenue remained unchanged while expenditure increased. And since they did not have to pay back the subsidy, moral hazard was likely. Inefficient fund utilization was thus inimical to economic growth.

The estimated coefficient of *EBR* is negative with a significance level of 1 per cent. Extra-budgetary revenue was at the disposal of the local government and new financial resources had to be found in order to increase extra-budgetary revenue, which discouraged work and investment and had a negative impact on economic growth.

If we subdivide the fiscal structure of provinces, the empirical results are as shown in Table 3. After subdividing expenditure and revenue into several categories, the impact on the regional economic growth of the various items of revenue and

TABLE 3 EMPIRICAL RESULTS (ERROR COMPONENTS MODEL) OF EQUATION (6) FOR ALL SAMPLES

Independent Variable	
ln py	0.0184 (0.0444)
FAI	0.3856 (0.0796)**
RA	0.4041 (0.4293)
RB	0.1087 (0.5902)
EA	-0.2567 (0.2269)
EB	-1.0992 (1.0290)
EBR	-0.8207 (0.3357)*
Root MSE	1.8231
Breusch-Pagan Test Lagrange Multiplier Statistic	0.06

Notes: **Indicates significance at the 1 per cent level; *indicates significance at the 5 per cent level; values in parentheses are standard deviations.

TABLE 4 CORRELATION COEFFICIENTS OF INDEPENDENT VARIABLES FOR EQUATION (6) FOR ALL SAMPLES

	py	FAI	RA	RB	EA	EB	EBR
py	1.0000	-0.1724	0.2636	0.0671	-0.3217	-0.0581	0.0114
FAI	-	1.0000	0.0409	-0.1049	0.1914	0.1510	0.1678
RA	-	-	1.0000	0.3137	0.0787	0.1187	0.5963
RB	-	-	-	1.0000	0.1204	0.1607	0.1134
EA	-	-	-	-	1.0000	-0.1807	0.1376
EB	-	-	-	-	-	1.0000	0.3283
EBR	-	-	-	-	-	-	1.0000

expenditure become insignificant. Only the estimated coefficients of *FAI* and *EBR* are significant at the 1 per cent and 5 per cent level, respectively, whilst the impact of initial condition and fiscal structure variables on economic growth are mitigated to be insignificant.

TABLE 5 EMPIRICAL RESULTS (ERROR COMPONENTS MODEL) FOR EQUATION (5) FOR THE TOP FIFTEEN PROVINCES OF THE SAMPLE

Independent Variable	
ln py	0.0351 (0.0051)**
FAI	0.7355 (0.0148)**
TR	-1.1863 (0.0088)**
TE	3.3479 (0.0723)**
EBR	-3.3787 (0.0357)**
Root MSE	12.5352
Breusch-Pagan Test Lagrange Multiplier Statistic	3.975

Notes: **Indicates significance at the 1 per cent level; values in parentheses are standard deviations.

Tables 5 through 8 list the empirical results for the sample of the top fifteen provinces ranked by their overall strength. In Tables 5 and 6, the respective Breusch and Pagan LMs are 3.975 and 0.0075; both are smaller than the chi-square distribution critical value of 6.63 with a significance level of 1 per cent and degree of freedom of 1. The model thus possesses homoskedasticity with no specification error. The correlation coefficients in Table 6 are between -0.6576 and 0.2934, whilst those in Table 8 are between -0.7544 and 0.6347; therefore, multi-collinearity does not exist between the two sets of independent variables. The empirical results in Table 5 show that the estimated coefficient of the initial condition (ln *py*) was positive.

TABLE 6 CORRELATION COEFFICIENTS OF INDEPENDENT VARIABLES FOR EQUATION (5) FOR THE TOP FIFTEEN PROVINCES OF THE SAMPLE

	py	FAI	TR	TE	EBR
py	1.000	-0.0468	-0.0458	0.1038	-0.1286
FAI	-	1.0000	-0.0914	-0.1350	0.1523
TR	-	-	1.0000	0.2934	-0.0625
TE	-	-	-	1.0000	-0.6576
TBR	-	-	-	-	1.0000

TABLE 7 EMPIRICAL RESULTS (ERROR COMPONENTS MODEL) FOR EQUATION (6) FOR THE TOP FIFTEEN PROVINCES OF THE SAMPLE

Independent Variable	
ln py	0.1309 (0.0054)**
FAI	0.9107 (0.0151)**
RA	-5.0970 (0.0899)**
RB	-7.1089 (0.0861)**
EA	12.0628 (0.1066)**
EB	-6.7550 (0.1743)**
EBR	-0.7955 (0.0504)**
Root MSE	17.3139
Breusch-Pagan Test Lagrange Multiplier Statistic	0.0075

Notes: **Indicates significance at the 1 per cent level; *indicates significance at the 5 per cent level; values in parentheses are standard deviations.

This is statistically meaningful with a significance level of 1 per cent, i.e., it does not support the conditional convergence hypothesis, whilst the development inclination of those provinces and regions that rank higher in overall strength is divergent. The estimated coefficient of the ratio of fixed assets to national income (*FAI*) is positive with a significance level of 1 per cent, which supports the expectations of the theoretical model. As in Table 1, the estimated coefficients of *TR* and *EBR* are both negative with a significance level of 1 per cent; what is different from those in Table 1 is that the estimated coefficient of *TE* is positive with a significance level of 1 per cent. Since the overall strength indicators include economic performance, provinces having superior overall strength also perform better economically; therefore, expenditure is favorable to economic growth.

TABLE 8 CORRELATION COEFFICIENTS OF INDEPENDENT VARIABLES FOR EQUATION (6) FOR THE TOP FIFTEEN PROVINCES OF THE SAMPLE

	py	FAI	RA	RB	EA	EB	EBR
py	1.0000	0.0426	0.0409	-0.1641	0.1825	-0.1615	-0.1015
FAI	-	1.0000	0.1249	-0.0430	0.0516	-0.1185	-0.0514
RA	-	-	1.0000	0.6347	-0.3052	0.1427	-0.7544
RB	-	-	-	1.0000	-0.3002	0.1921	-0.4742
EA	-	-	-	-	1.0000	0.0570	-0.1086
EB	-	-	-	-	-	1.0000	-0.3059
EBR	-	-	-	-	-	-	1.0000

As in Table 5, analysis of the results in Table 7 show that the estimated coefficient of the initial condition (ln *py*) was positive. The estimated coefficient of *FAI* is positive, whilst that of *EBR* is negative, both with a significance level of 1 per cent. With regard to the fiscal revenue sub-category, the estimated coefficients of both *RA* and *RB* are negative with a significance level of 1 per cent, i.e., if expenditure remains unchanged, any increase in revenue is unfavorable to employment and investment, as well as to economic growth. As for the case of the expenditure sub-category, as in Equation (6), the estimated coefficient of *EA* is positive; this is statistically meaningful with a significance level of 1 per cent, thus suggesting that expenditure of *EA* has something to do with economic growth. Economic growth is helped by higher efficiency, which is led by higher overall strength. The estimated coefficient of *EB* is negative with a significance level of 1 per cent. Since *EB* is the expenditure arising from price subsidy, an increase in this type of expenditure contributes little to economic growth. The empirical results for the bottom fifteen provinces ranked by overall strength are listed in Tables 9 to 12. As Tables 9 and 11 show, the respective Breusch and Pagan LMs are 0.0225 and 0.075; both are smaller than the chi-square distribution critical value of 6.63 with a significance level of 1 per cent and degree of freedom of 1.

TABLE 9 EMPIRICAL RESULTS (ERROR COMPONENTS MODEL) FOR EQUATION (5) FOR THE BOTTOM FIFTEEN PROVINCES OF THE SAMPLE

Independent Variable	
ln py	-0.1329 (0.1515)
FAI	0.3436 (0.1259)**
TR	-0.2239 (0.1206)
TE	-0.5713 (0.2307)*
EBR	-0.5197 (0.5279)
Root MSE	1.3093
Breusch-Pagan Test Lagrange Multiplier Statistic	0.0225

Notes: **Indicates significance at the 1 per cent level; *indicates significance at the 5 per cent level; values in parentheses are standard deviations.

TABLE 10 CORRELATION COEFFICIENTS OF INDEPENDENT VARIABLES FOR EQUATION (5) FOR THE BOTTOM FIFTEEN PROVINCES OF THE SAMPLE

	py	FAI	TR	TE	EBR
py	1.000	-0.0598	0.5165	0.3480	-0.2417
FAI	-	1.0000	0.1795	-0.1545	-0.1196
TR	-	-	1.0000	0.3983	-0.2233
TE	-	-	-	1.0000	0.2920
TBR	-	-	-	-	1.0000

TABLE 11EMPIRICAL RESULTS (ERROR COMPONENTS MODEL) FOR EQUATION (6) FOR THE BOTTOM FIFTEEN PROVINCES OF THE SAMPLE

Independent Variable		
ln py	0.0525	(0.1388)
FAI	0.3268	(0.1549)*
RA	0.0104	(0.7770)
RB	-0.3065	(1.1191)
EA	-0.4297	(0.3183)
EB	-1.5431	(2.0488)
EBR	-0.7531	(0.7511)
Root MSE	1.0898	
Breusch-Pagan Test Lagrange Multiplier Statistic	0.0750	

Notes: *Indicates significance at the 5 per cent level; values in parentheses are standard deviations.

TABLE 12 CORRELATION COEFFICIENTS OF INDEPENDENT VARIABLES FOR EQUATION (6) FOR THE BOTTOM FIFTEEN PROVINCES OF THE SAMPLE

	py	FAI	RA	RB	EA	EB	EBR
py	1.0000	-0.2279	0.3715	-0.0521	0.3501	-0.2511	-0.1896
FAI	-	1.0000	0.0965	-0.1167	-0.2881	0.2148	-0.1772
RA	-	-	1.0000	-0.1266	0.3458	-0.0506	-0.4530
RB	-	-	-	1.0000	0.0173	0.0318	0.1734
EA	-	-	-	-	1.0000	-0.1620	-0.2028
EB	-	-	-	-	-	1.0000	-0.4143
EBR	-	-	-	-	-	-	1.0000

The model thus possesses homoskedasticity with no specification error. The correlation coefficients in Table 10 are between -0.2417 and 0.5165, whilst those in Table 12 are between -0.4530 and 0.3715; therefore, multi-collinearity does not exist between the two sets of independent variables.

As shown in Table 9, the estimated coefficient of *FAI* is positive with a significance level of 1 per cent, whilst the estimated coefficient of *TE* is negative with a significance level of 5 per cent. The signs of *TE* in Tables 1 and 9 are negative

and significant. Since the observed samples in Table 9 are of inferior overall strength, they tend to perform worse economically; those bottom provinces had had to depend heavily on central government subsidies, again moral hazard was likely, therefore, inefficient expenditure is unfavorable to economic growth. Analysis of Table 11 reveals that the estimated coefficient of *FAI* was positive with a significance level of 5 per cent; therefore, an increase in fixed assets investment is favorable to economic growth.

CONCLUSIONS

During the process of institutional transformation, China's fiscal system has gone through several stages of evolution and even the fiscal contract system itself went through many changes between 1980 and 1993. The empirical results for the whole sample show an inclination towards convergence of regional economic growth, thus supporting the conditional convergence hypothesis. In addition, an increase in regional tax revenue hinders investment and employment due to excessive taxation, which is unfavorable to economic growth. The same finding applies to extra-budgetary revenue. The fiscal contract system required provinces to balance their budgets, and if revenue remained unchanged, then increased expenditure had to be subsidized by the central government. Since the local governments did not have to pay back the subsidy, inefficient funds utilization was likely and there was thus little contribution to economic growth.

Ranked by their overall strength, the provinces were divided into economically advanced and backward groups for empirical testing. Comparison of the empirical results with the sample of the top and bottom fifteen provinces, in terms of their overall strength, demonstrated that the economic growth of the top fifteen provinces tended to be divergent. More fiscal revenue and extra-budgetary funds are unfavorable to economic growth; the results are the same for all provinces, and they remain the same when fiscal revenue is itemized. The difference between the two lies in fiscal expenditure. The economic growth of those provinces with superior overall strength gains from fiscal expenditure because of their superior efficiency performance, whilst the opposite is true for those with inferior overall strength.

The empirical findings also have some important implications for China's transitional economy and other developing economies. The transformed government system (both central and local) has to assume functions corresponding to the market mechanism, or face the grave consequences of government failure. The issues of defining central and local government rights and responsibilities, improving rule of law, solidifying local democracy and elevating government efficiency are challenges which a reform-minded government has to tackle immediately.

ENDNOTES

[1]For a discussion on the tax assignment system, see Herscher (1995), Ma (1995), Hu (1998), Zhao and Zhang (1999) and Lee (2000).
[2]Guangdong and Fujian provinces adopted 'separating revenue and expenditure; submitting a fixed amount; or being subsidized a fixed amount'. Guangdong submitted Renminbi (RMB) 1 billion while Fujian was subsidized RMB150 million annually.
[3]Total amount sharing' relied heavily on tax items to distinguish between different fiscal revenues.
[4]Categorization of fiscal revenue and expenditure has to take into account multicollinearity. Fiscal revenue comprises of various types of taxes, enterprise income, and others, whilst fiscal expenditure comprises of economic construction, culture and education, administration and price subsidies. Based on this categorization, multicollinearity exists between the independent variables; therefore, our empirical analysis does not use this type of categorization.

REFERENCES

Abizadeh, S. and Gray, J., "Wagner's Law: A Pooled Time-Series Cross-Section Comparison", *National Tax Journal*, Vol. 38 (1985), pp.209-18.

Ashworth, J., "Spurious in Mexico: A Comment on Wagner's Law", *Public Finance*, Vol. 49 (1994), pp. 282-86.

Barro, R.J., "Economic Growth in a Cross Section of Countries", *Quarterly Journal of Economics*, Vol. 106 (1991), pp.406-43.

Barro, R.J. and Sala-i-Martin, X., "Convergence", *Journal of Political Economy*, Vol. 100 (1992), pp.223-51.

Barth, J.R., Keleher, R.E. and Russek, F.S., "The Scale of Government and Economic Activity", *Southern Business & Economic Journal*, Vol. 13 (1990), pp.142-83.

Bird, R.M., "Wagner's Law of Expanding State Activity", *Public Finance*, Vol. 26 (1971), pp. 1-26.

Bohl, M.T., "Some International Evidence on Wagner's Law", *Public Finance*, Vol. 51 (1996), pp.185-200.

Breusch, T.S. and Pagan, A.R., "The Lagrange Multiplier Test and Its Applications to Model Specification in Econometrics", *Review of Economic Studies*, Vol. 47 (1980), pp. 239-53.

Chang, T., "An Econometric Test of Wagner's Law for Six Countries Based on Cointegration and Error-Correction Modeling Techniques", *Applied Economics*, Vol. 34 (2002), pp. 1157-69.

Chen, C.H., "Fiscal Decentralization, Collusion and Government Size in China's Transitional Economy", *Applied Economics Letters*, Vol. 11 (2004), pp. 699-705.

Christ, C.F., "A Simple Macroeconomic Model with a Government Budget Restraint", *Journal of Political Economy*, Vol. 76 (1968), pp. 53-67.

Christ, C.F., "On Fiscal and Monetary Policies and the Government Budget Restraint", *American Economic Review*, Vol. 69 (1979), pp. 526-38.

Drummond, D. J. and Gallant, R. A., *The TSCSERG Procedure*, NC: SAS Institute Inc., 1992.

Easterly, W. and Rebelo S., "Fiscal Policy and Economic Growth: An Empirical Investigation", *Journal of Monetary Economics*, Vol. 32 (1993), pp.417-58.

Eckaus, R.S., "Some Consequences of Fiscal Reliance on Extrabudgetary Revenues in China", *China Economic Review*, Vol. 14 (2003), pp.72-88.

Fischer, S., "The Role of Macroeconomic Factors in Growth", *Journal of Monetary Economics*, Vol. 32 (1993), pp.485-512.

Han, X. and Zhang, Y., "The Relationship between Central and Local Government during the Transition to Market Economy", *Jingji Lilun yu Jingji Guanli* (*Economic Theory and Business Management*), No. 3 (1995), pp.34-9.

Helms, L.J., "The Effect of State and Local Taxes on Economic Growth: A Time Series Cross Section Approach", *Review of Economics and Statistics*, Vol. 67 (1985), pp. 574-82.

Henrekson, M., "Wagner's Law- A Spurious Relationship?", *Public Finance*, Vol. 48 (1993), pp. 406-15.

Herschler, S.B., "The 1994 Tax reforms: The Center Strikes Back", *China Economic Review*, Vol. 6 (1995), pp. 239-45.

Hondroyiannis, G. and Papapetrou, E., "An Examination of Wagner's Law for Greece: A Cointegration Analysis", *Public Finance*, Vol. 50 (1995), pp.67-79.

Hu, A., "An Arduous and Difficult Institutional Innovation: A Preliminary Assessment of the Reform in the Tax-Sharing System", *Chinese Economy*, Vol. 31 (1998), pp.30-96.

Islam, A.M., "Wagner's Law Revisited: Cointegration and Exogeneity Tests for the USA", *Applied Economics Letters*, Vol. 8 (2001), pp.509-15.

Jiang X., "On Public Finance Policy from Macroeconomics Motion Review", *Jingji Yanjiu* (*Economic Research Journal*), No. 10 (1996), pp.16-24.

Jin, H., Qian, Y. and Weingast, B.R., "Regional Decentralization and Fiscal Incentives: Federalism, Chinese Style", *Journal of Public Economics*, Vol. 89 (2005), pp.1719-42.

Kneller, R., Bleaney, M.F. and Gemmell, N., "Fiscal Policy and Growth: Evidence from OECD Countries", *Journal of Public Economics*, Vol. 74 (1999), pp.171-90.

Kolluri, B.R. and Panik, M.J., "Government Expenditure and Economic Growth: Evidence from G7 Countries", *Applied Economics*, Vol. 32 (2000), pp.1059-68.

Krueger, A.O., "Government Failures in Development", *Journal of Economic Perspectives*, Vol. 4 (1990), pp.9-23.

Lee, P.K., "Into the Trap of Strengthening State Capacity: China's Tax-Assignment Reform", *China Quarterly*, No. 164 (2000), pp.1007-24.

Lee, Y. and Gordon, R.H., "Tax Structure and Economic Growth", *Journal of Public Economics*, Vol. 89 (2005), pp.1027-43.

Levine, R. and Renelt, D., "A Sensitivity Analysis of Cross-Country Growth Regressions", *American Economic Review*, Vol. 82 (1992), pp. 942-6.

Lin, J.Y. and Liu, Z., "Fiscal Decentralization and Economic Growth in China", *Economic Development and Cultural Change*, Vol. 49 (2000), pp.1-21.

Ma, J., "The Reform of Intergovernmental Fiscal Relations in China", *Asian Economic Journal*, Vol. 9 (1995), pp.205-32.

Ma, H., Liu, C. and Lu, B., *Report of China's Macroeconomic Policy 1997* (*Zhongguo Hongquan Jingji Zengce Baokao 1997*), Beijing: China Finance and Economics Publisher, 1997.

Mankiew, N.G., Romer, D. and Weil, D.N., "A Contribution to the Empirics of Economic Growth", *Quarterly Journal of Economics*, Vol. 107 (1992), pp.407-37.

Martinez-Vazquez, J. and McNab, R.M., "Fiscal Decentralization and Economic Growth", *World Development*, Vol. 31 (2003), pp. 1597-616.

Miller, S.M. and Russek, F.S., "Fiscal Structures and Economic Growth at the State and Local Level", *Public Finance Review*, Vol. 25 (1997a), pp. 213-37.

Miller, S.M. and Russek, F.S., "Fiscal Structures and Economic Growth: International Evidence", *Economic Inquiry*, Vol. 35 (1997b), pp. 603-13.

Ministry of Finance, *China Finance Statistics 1950-1991*, Beijing: Science Press, 1992.

Ministry of Finance, Beijing: *Finance Yearbook of China 1993-1994*, Zhongguo Caizheng Press, 1993-1994.

Mofidi, A. and Stone, J.A., "Do State and Local Taxes Affect Economic Growth?", *Review of Economics and Statistics*, Vol. 72 (1990), pp. 686-91.

Mundlak, Y., "On the Pooling of Time Series and Cross Section Data", *Econometrica*, Vol. 46 (1978), pp. 69-85.

Murthy, N.R.V., "Further Evidence of Wagner's Law for Mexico: An Application to Cointegration Analysis", *Public Finance*, Vol. 48 (1993), pp.92-96.

Murthy, N.R.V., "Wagner's Law, Spurious in Mexico or Misspecification: A Reply", *Public Finance*, Vol. 49 (1994), pp. 295-303.

Payne, J.E. and Ewing, B.T., "International Evidence on Wagner's Hypothesis: A Cointegration Analysis", *Public Finance*, Vol. 51 (1996), pp.258-74.

Ram, R., "Causality between Income and Government Expenditure: A Broad International Perspective", *Public Finance*, Vol. 41 (1986), pp. 393-414.

Sala-i-Martin, X., "Regional Cohesion: Evidence and Theories of Regional Growth and Convergence", *European Economic Review*, Vol. 40 (1996), pp.1325-52.

Singh, B. and Sahni, B.S., "Causality between Public Expenditures and National Income", *Review of Economics and Statistics*, Vol. 66 (1984), pp.630-43.

State Statistical Bureau, *Statistical Yearbook of China 1990-1994*, Beijing: Zhongguo Caizheng Press, 1990-1994.

Zhang, T. and Zou, H., "Fiscal Decentralization, Public Spending, and Economic Growth in China", *Journal of Public Economics*, Vol. 67 (1998), pp. 221-40.

Zhao, X.B. and Zhang, L., "Decentralization Reforms and Regionalism in China: A Review", *International Regional Science Review*, Vol. 22 (1999), pp. 251-81.