

Township and Village Enterprises, Openness, and Regional Economic Growth in China

by

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Abstract

By most standards China's post-1978 economic reforms have been a colossal success. Much of that success can be attributed to China's encouragement of foreign trade and its shift from state-owned enterprises to more market-oriented institutions such as Township and Village Enterprises (TVEs). This paper uses a province-level panel analysis to measure the contribution these reforms have made to China's growth. Like earlier cross-section studies of economic growth rates, the model explains differences in growth rates of per capita income between provinces by using initial endowments, demographic variables, and measures of investment in human and physical capital as explanatory variables. Important contributions in this study are its focus on the role of TVEs and foreign trade and its use of time series data from the provinces, which significantly expands the number of observations available.

Our analysis of growth in China's provinces yields results that are consistent with earlier cross-country studies, such as strong evidence of convergence, a positive role for lagged investment, and an insignificant role for human capital investment, as measured by school enrollment. China's market-oriented reform has also contributed to its growth: openness has played a positive role, and Township and Village Enterprises have been strongly significant.

JEL Classification: O4, O5, P2, P3

Key Words: economic growth, economic reform, China, transition economies, openness, township and village enterprises

1. Introduction

This study examines China's economic growth in the context of transition from a centrally planned economy (CPE) to a market economy. China's market-oriented economic reform was launched in 1978 when the Third Plenary Session of the 11th CPC Central Committee adopted a set of policies whose objective was to reform the domestic economy and open it to the outside world.¹

Though the Chinese continue to advocate a "socialist market economy," or "socialism with Chinese characteristics," implying, among other things, limited privatization,² measures such as the "household contract responsibility system" and the "open door policy" have irrevocably changed its economy and society. The state sector now accounts for only 29% of industrial output, down from 78% in 1978. The so-called township and village enterprises³ (TVEs), arguably the most distinctive feature of the Chinese transition, proliferated and became a major economic force. In 1978, 1.5 million TVEs employed 28.2 million workers, whereas by 1996, 23.4 million TVEs employed 135.1 million workers. Private enterprises, which according to estimates account for one quarter of total output, are also increasing fast and poised to, perhaps become the new engine of growth.⁴ The coastal areas, specially targeted for development, have attracted billions of dollars in capital. Foreign direct investment (FDI), which averaged about \$2 billion dollars per year during the 1980s, jumped to more than \$200 billion in the 1990s.⁵ China's trade record is equally impressive, with exports and imports growing at average rates of 15% and 13% a year, respectively, during the last two decades.

The results in terms of economic growth have been staggering. Between 1978 and 1996 real per capita GDP increased at an annual average rate of about 8% (Table 1). The accumulated rate of growth varies from 682% (Fujian province) to 75% (Tibet autonomous region) for the same period. A casual reading of Table 1 suggests that "convergence" may be at work: generally speaking, regions with lower than average real per capita GDP in 1978 are growing at faster rates than regions with higher than average real per capita GDP. The three municipalities of Beijing, Shanghai and Tianjin⁶, which started out with a relatively high per capita income, exhibit much lower rates of growth. In addition, the last three columns in Table 1 provide a simple measure of regional growth disparities by showing GDP per capita for each region as a proportion of the national average for 1978 and 1996. Again the three municipalities seem to be losing, relatively

speaking, while the largest gains go to the island of Hainan and the coastal provinces of Zhejiang, Fujian, Guangdong, Shandong, and Guangxi. Trends in regional disparities are the focus of Tian's (1999) study, which looks more closely at alternative output and consumption measures.

[Insert Table 1]

This study attempts to identify and estimate China's sources of economic growth by analyzing data for all 30 regions (municipalities, provinces, and autonomous regions) for the period 1978 to 1996.⁷ The contributions of market-oriented policies such as foreign direct investment (FDI), the creation of targeted areas like Special Economic Zones (SEZs), and the impact of openness to foreign trade are examined. In addition, special attention is given to the role of township and village enterprises (TVEs).

The paper is organized as follows: part 2 provides an overview of some aspects of China's economic reform, including a discussion on the origins and role of township and village enterprises, and part 3 presents the model and examines the empirical findings. Some concluding remarks are made in part 4.

2. China's Economic Reform: An Overview

China's economic reform first succeeded in the countryside,⁸ with the "household (contract) responsibility system." Under this system, farmers were given the right to use the land for a period of 15 years and considerable management autonomy. Once they met the production targets set by the state and sold to the state at fixed prices, they could sell the surplus in the open market (dual-price system). As a result their productivity increased dramatically, particularly during the period 1979-84. The contract system quickly spread to township and village enterprises (mostly small industrial units) and in 1984 was adopted in a variety of forms by state-run enterprises. Essentially, this system does reward economic efficiency with wage bonuses or the retaining of "excess profits." Under this system there is a separation between ownership and right of use, control and management. There is still state ownership, but the enterprises have considerable autonomy in terms of management (price, wages, investment decisions) in exchange for fulfilling output and/or profit obligations on a "contract" basis.

From 1979 to 1991 an open coastal belt, covering 289 cities and counties, an area of .32 million square kilometers, and a population of .2 billion was developed. In the spring of 1979 leaders of the CPC decided to create special economic zones in the provinces of Guangdong

(Shenzhen, Zhuhai, Shantou) and Fujian (Xiamen), to take advantage of the proximity to Hong Kong, Macao, and Taiwan. In April 1988, Hainan island became the fifth and largest SEZ with a population of 6 million and an area of 33,920 km². The SEZs are zones in which “special” economic policies and “special” economic management systems are carried out. They are designed to attract foreign investment, are essentially market regulated and enjoy a relatively high level of autonomy. In May 1984, Dalian, Qinhuangdao, Tianjin, Yantai, Qingdao, Lianyungang, Nantong, Shanghai, Ningbo, Wenzhou, Fuzhou, Guangzhou, Zhanjiang, and Beihai, became Coastal Open Cities (COCs). These cities were selected because of their rich natural and human resources, sound industrial foundations and location advantages in terms of transportation and communications. Following the success of the COCs in 1985, the CPC and the State Council decided to establish 3 Coastal Economic Development Areas (CEDAs): Changjiang (Yangtze River) Delta, Zhujiang (Pearl) Delta, and the delta area that covers Xiamen, Zhangzhou, and Quanzhou in Southern Fujian. In 1988, two new CEDAs were created: Liaoning Peninsula and Shandong Peninsula. These 5 CEDAs consist of about 204 counties and towns over the following provinces: Jiangsu, Zhejiang, Fujian, Guangdong, Hebei, Liaoning, Shandong; the Guangxi Zhuang Autonomous Region, and the cities of Shanghai and Tianjin. Like SEZs and COCs, CEDAs are designed to benefit from foreign trade and FDI. They were designed to absorb foreign capital and technology, promote scientific and technological development, gain managerial experience, produce higher quality products, adjust agricultural structure, and serve as tests for economic reform.

These reforms are dramatically changing the economic landscape, namely in terms of ownership (Table 2). The most striking change is the shrinking share of the state sector, which now accounts for less than one third of industry’s gross output value.⁹ Collective ownership almost doubled from 1978 to 1996, whereas individual ownership and other (such as joint ventures and foreign enterprises) went from zero to 15.5 and 16.6% respectively. They are both increasing very fast.

[Insert Table 2]

Though some economists recognize that State Owned Enterprises (SOEs) played a positive role in the transition process, they believe time has come for China to privatize the SOE sector (Naughton, 1994a). Under China's “share holding” approach, the capital of state-owned

enterprises (either the original or the additional capital) is to be converted into shares to be sold to the employees or the public. In May 1990, the government endorsed this practice but subject to serious restrictions. Public ownership must be dominant, and share ownership is limited to joint-ventures, township and village enterprises, and to special economic zones and open coastal cities, of which Shenzhen and Shanghai (sites of the two Chinese stock exchanges) have been the most successful. As a result, only a few SOEs have been privatized. A bankruptcy law was passed, but only smaller firms have been closed. In November 1993, the Chinese government announced sweeping reforms including a restructuring of the state-owned sector. Though many small state enterprises have undergone “restructuring” since then, the official attitude toward privatization of the SOEs seems to have shifted from a very ebullient position in 1993 to a more conservative approach that may reflect a desire by some to hold on to a large state sector. SOEs are China’s Achilles heel.¹⁰ They employ two-thirds of all urban workers but have become a major drag in the economy, soaking up to 90% of the financial resources of the four state banks. It has been suggested that China’s bid to join the World Trade Organization is an attempt by reformers to “shake things up.” Undoubtedly, the changes under the WTO agreement are bound to have a profound effect in China’s domestic economy, especially its financial system.

Collectively owned enterprises include urban as well as rural enterprises.¹¹ The latter are usually termed township and village enterprises. These are not collectives in the ordinary sense but rather community enterprises, encouraged by the existence of surplus labor in the rural communities and the lack of mobility among those communities. Many of these enterprises have strong linkages to agriculture, both backward and forward, such as farm machinery, fertilizers, and feed/grain processing. Though they first appeared in 1956, it was with the rural economic reform that they exploded. In 1980 they adopted the contract responsibility system and shared ownership, with employees as shareholders. They typically have more independence and flexibility than SOEs and face “harder” budget constraints. Key to their success seems to be the high degree of competition, flexibility, and autonomy, which occurred without significant privatization.

It was only after 1984 that private enterprises with more than seven employees were allowed (Xie 1992). A privately owned enterprise can consist of one (self-employed) owner, who may hire up to seven other workers (individual units), or it may take the form of an enterprise

that hires more than eight people (private enterprises).¹² From 1978 to 1988, private enterprises grew quite rapidly, but in 1989 they suffered a sharp decline. In 1993, 25% suffered losses, partly due to an austerity program designed to fight inflation. Since then, private enterprises have been growing rapidly.

Township and Village Enterprises

These rural enterprises first appeared in the 1950s, but it was only in the Deng era that they multiplied. After reform, commune and brigade owned enterprises were reclassified as township and village enterprises (TVEs), but the development and dramatic growth of the TVEs can only be understood in the context of China's transition strategy. TVEs are viewed as a natural response to a strategy of transition that first liberalized the product markets, without liberalizing factor markets (Naughton, 1994a). TVEs gave rural communities (townships and villages) the ability to transform control over assets into income in the "absence of asset markets." This could be done without resorting to privatization. And the profits of those enterprises could then be used for the benefit of the entire community. These local government units also facilitated the channeling of funds (mostly from households) in the absence of a well-functioning banking system.

Though the proliferation of the TVEs was to a large extent a reaction to China's transition strategy, it was only made possible by the pre-reform existing conditions. In contrast to the Soviet-type model that favored centralization and specialization at the "country" level, the Maoist view of local self-sufficiency resulted in substantial decentralization and specialization at the province and local level. Only six percent of Chinese industrial enterprises could be classified as large or medium scale prior to the market reforms, while seventy-eight percent of Chinese enterprises were small scale, labor-intensive collectives controlled by local governments (Nee, 1992). Also, decisions concerning distribution of resources and products were made on a multi-tiered level, with the central government delegating authority to regional and local governments. Moreover, the difficulty in the implementation of central planning in China fostered relationships between township enterprises and SOEs early on, which helps explain the rapid development of township enterprises (Hua, Zhang and Luo, 1993), and the subsequent expansion of subcontracting ties between SOEs and TVEs.

Economic reforms further favored TVEs. State monopoly of several economic sectors

(such as manufacturing) was relaxed and barriers to entry removed, enabling TVEs to engage in activities previously denied to them (Naughton, 1994a). Local governments were given greater powers and more incentives to develop local market economies based on private or collective ownership. Collectives became the main source of local revenues, forging a mutual dependence between local enterprises and local governments. This “partnership” effectively energized and enabled the local firms and collectives to compete against large SOEs for resources and markets. Also, of special significance was the reform of foreign trade and its subsequent decentralization to provincial and local level. This measure led to the “internationalization of the countryside” (Zweig, 1990) and resulted in dramatic increases in TVEs’ exports (Lardy, 1992).

The Statistical Yearbook of TVEs divides TVEs into four groups: towns, villages, cooperatives and individual. “Generally speaking, TVEs are privately- or collectively-owned enterprises involved in non-agricultural work” (Chian et al. 1996).¹³ Because of flexibility and adaptability to the environment, TVEs’ structures and development patterns vary from locale to locale throughout China.¹⁴

In many TVEs ownership can be characterized as “fuzzy.” According to Weitzman and Xu (1994) a TVE is “best described as a vaguely defined cooperative, meaning an essentially communal organization quite far removed from having a well-defined ownership structure,” with “a deep involvement of the community government.” Nevertheless, it should be noted that in most TVEs the township and village officials possess all the key components of property rights, namely control of residual income, the right to dispose of assets, and the right to appoint and dismiss managers and assume direct control if necessary. Though property rights for TVEs may be not precisely defined in a legal framework, in practice they are fairly clearly specified (Naughton, 1994a).

Most studies have concluded that the TVE sector is more efficient than the SOE sector (Woo et al., 1994; Chen et. al, 1992). Tian (1997) suggests that TVEs and other non-state owned enterprises allocate inputs more efficiently than state-owned enterprises. Using data for the 1979-91 period, Weitzman and Xu (1984) found that TVEs’ total factor productivity grew three times as fast as the corresponding SOEs’. The following, in addition to higher flexibility and autonomy, have been identified as advantages of the TVEs: shorter information channels between principals and agents, greater focus on financial objectives (lower costs), harder budget

constraints, and special ties with the state sector (Jefferson and Rawski, 1994).

Some attribute the economic success of the TVEs to advantages that stem from their peculiar “internal institutional form” which facilitates cooperation through *implicit contracts* among community members locked into an ongoing relationship (Weitzman and Xu, 1994; Nee, 1992). It has been suggested that it is the interaction of these enterprises with the whole community through a “set of interlocking financial, administrative, personnel, and other ties” (Byrd, 1990), the existence of a strong “cooperative culture” (Weitzman and Xu, 1994), that is behind their success. Undoubtedly, local government sponsorship brings certain advantages such as privileged access to capital and coordination with urban firms. On the other hand, these special ties between government, community, and TVEs usually result in a “redistribution of income.”¹⁵ Others instead (Naughton, 1994a) emphasize the external conditions to which TVEs are an effective adaptation. Zhang et al. (1994) attribute the “rural enterprise boom,”¹⁶ of which TVEs are a major part, to the existence of barriers to factor mobility, price distortions and the abundant labor in the rural areas. Their study shows that exports contributed to rural enterprises growth.

3. Empirical Evidence

Assume that a province’s real GDP is given by the Cobb-Douglas production function¹⁷

$$Y = AH^{\beta_1}K^{\beta_2}L^{\beta_3}Z^{\beta_4} \quad (1)$$

where A denotes the level of production technology in the province; H, K and L denote the quantities of human capital, physical capital and labor employed in the province; and Z represents other factors (such as natural resource endowments or the presence of collectives) that might affect the level of output. Denoting rates of change of variables by lower-case symbols, this function implies that $y = a + \beta_1h + \beta_2k + \beta_3l + \beta_4z$, so we would predict that the growth rate of output in a province is an increasing function of its growth rates of technology, the three input quantities, and other factors.

Our primary interest is in improvements in living standards, so we focus on growth in real output per capita in each province, which could be denoted $y - n$, where n is the population growth rate. We estimate this model using a longitudinal panel¹⁸ including province-specific data from the years 1978 through 1996. All data are taken from issues of the *China Statistical Yearbook*, the *China Statistical Abstract* and other official sources.

Province-specific data on the adoption of new technology are not available, so changes in the production technology are assumed to be accessible throughout China, and the rate of change in technology (“a” in the equation above) is subsumed in the common intercept term in the regression model. Growth rates of human capital would be best represented by rates of change in educational attainment, which could be measured by the share of the population that is college educated. However, we do not have data on educational attainment, so instead we use data on secondary school enrollment (*SECSHARE*) in each province (measured as a percentage of the province’s population) to represent the growth rate of human capital. This is expected to have a positive effect on the growth rate of output.¹⁹

We do not have complete data on net investment and total fixed assets by province throughout the period in question, so we cannot calculate the growth rate of the capital stock directly. Instead we include as an explanatory variable the ratio of total investment in fixed assets to GDP (*INVSHARE*) in each province,²⁰ which also is expected to have a positive coefficient.

Labor force data for some years are unavailable; but growth in the labor force is reflected in population growth data, which we do have. If the ratio of the labor force to total population (*L/N*) did not change significantly over time, then the growth rate of the population would be a perfect proxy for labor force growth. In this case the model could be rewritten as

$$y - n = a + \beta_1 h + \beta_2 k + (\beta_3 - 1)n + \beta_4 z, \quad (2)$$

and β_3 could be inferred from the estimate of the population growth coefficient. We would expect this coefficient to lie between zero and -1 (since β_3 would lie between zero and 1 if the economy exhibits diminishing returns to labor). If instead the labor force participation rate has grown slowly over time, then we would expect the coefficient on the population growth term to be negative and closer to zero.

In the Cobb-Douglas formulation and other interesting specifications the impacts of changes in investment or other variables vary along the production function. In this analysis this is incorporated by including each province’s level of per capita real GDP in 1978 as an explanatory variable. We expect to find that the initial level of per capita real GDP has a negative coefficient, indicating that provinces that are poorer initially tend to grow faster and converge over time relative to the richer provinces. The possibility of convergence has been an important

focus of many earlier, cross-country studies of the sources of economic growth.²¹ Our work looks for evidence of this effect among China's provinces.

The sum of exports and imports as a share of GDP is used as an explanatory variable (*OPENNESS*) to assess the openness of the economy.²² We expect its coefficient to be positive. We also explored the roles of two other related variables. The first (*FORNINV*) is the share of total investment that is funded from foreign sources. If foreign investment is accompanied by significant technology spillovers, we expect this variable to have a positive impact on growth. The second variable is a dummy variable that would capture the preferential treatment associated with the creation of Special Economic Zones in Guangdong and Fujian in 1979 and in Hainan in 1988. We would expect these to grow faster in subsequent years, so this variable would be expected to have a positive impact. The last two variables proved to be highly correlated with the *OPENNESS* variable, so only one of these three variables can be included in a regression to avoid multicollinearity.²³

Changes in economic policy and market structure are also reflected in the *COLLSHARE* variable, which measures the output of collectives (as a proxy for township and village enterprises) as a share of total industrial output in each province. We expect the coefficient on this variable also to be positive for the reasons discussed in part 3.

Natural resource endowments are measured by each province's coal reserves and its use of hydroelectric power. The data do not exhibit notable changes in these variables over time, so they are included in the model in terms of levels rather than growth rates. To the extent that these endowments significantly spur a province's growth, we would expect the coefficients on these variables to be positive.

We estimate two models using fixed-effects ordinary least squares.²⁴ The fixed-effects specification allows the intercept term to vary between years, so the intercept term captures national trends such as business cycle fluctuations. Model I, presented in two alternative versions in Table 3, takes fullest advantage of the panel data, which include observations on thirty provinces for nineteen years. Missing data reduce the number of observations by about one hundred.²⁵ The calculation of growth rates and lagged variables reduces the sample size by another thirty, and the unavailability of data on exports and imports (and thus *OPENNESS*) for

the years 1990 and 1991 results in the loss of sixty more observations when that variable is included.

[Insert Table 3]

We find strong evidence of convergence (since the coefficient on 1978 per capita income is negative and significant), which is consistent with Tian's (1999) analysis of inter-provincial output disparities. We also find a positive role for lagged investment (although the latter is not significant when *OPENNESS* is included). While the growth model posits a supply-side relationship between investment and growth, there could also be a same-year demand-side relationship (since investment is an important component in GDP).

The coefficient on the population growth term is negative and significant, which is consistent with previous studies. On the other hand, changes in human capital, measured by the share of school enrollment in the population, are of the expected sign but insignificant. The insignificance of this coefficient is not surprising, since school enrollment is a flawed measure of human capital. School enrollment varies little between provinces and over time, and it describes where people are educated rather than where they ultimately live and work. As suggested above, we would expect to obtain more significant results if we instead had a measure of educational attainment in each province.

More important, we obtain evidence that the economic reforms of the last twenty years have promoted economic growth. The positive, significant coefficient on the *OPENNESS* variable suggests that foreign trade contributes to growth, perhaps by opening the economy to new technology and enhancing productivity. Our results also show clearly that the share of TVEs in the economy (as reflected in the *COLLSHARE* variable) has a positive and significant impact on growth rates. We can conclude that TVEs have indeed stimulated real economic growth and promoted significant improvements in living standards.

Model I assumes that the explanatory variables affect real growth contemporaneously (except investment, which enters with a one-year lag). But in principle we would expect these variables to affect real growth both contemporaneously and with (possibly long) lags. Model II captures this possibility in a simple way by considering long-run averages of the panel data. More specifically, the nineteen-year span of this study is divided into three longer periods: six years from 1978 through 1983; seven years from 1984 through 1990; and six years from 1991

though 1996. All variables included in Model I are averaged within each of these periods to create a three-period, long-run panel. Results from the fixed-effects analysis of Model II are presented in Table 4.

[Insert Table 4]

The long-run results are quite similar to those from Model I. School enrollment and initial endowments of coal and hydroelectric power again are not significant. As in Model I, the coefficient on the population growth rate is negative and significant, although the coefficient in Model II is larger than expected. Once again we find strong evidence of convergence and positive and significant roles for investment, the share of collectives in total industrial output, and openness.

4. Concluding Remarks

This paper uses a model usually associated with cross-country growth studies to identify and estimate various sources of economic growth in post-economic reform China. Regional differences in growth rates of per capita income are explained by differences in investment rates for physical capital and human capital, population growth, and reform-specific factors such as the presence of township and village enterprises and China's openness to international trade.

We found a positive role for openness in determining growth rates. Regressions of trade on income in cross-country studies generally find only a very moderate impact, maybe because the trade share is endogenous.²⁶ In this study the openness variable also captures the effects of other factors (such as foreign direct investment and Special Economic Zones) that promote faster growth in particular regions.

Human capital investment appears to be insignificant. This finding is consistent with similar panel data studies and appears to be inherent in the use of schooling as a measure of human capital. Estimates of the impact of natural resource endowments generally are not significant, perhaps suggesting that these resources can be transported between provinces relatively easily.

The estimate for population growth is negative and significant, which is consistent with cross-country growth studies as well. Explanations given for a negative coefficient typically involve decreases in average human capital and the capital-labor ratio. Fertility rates are also found to have a negative link to growth. And finally, population growth may generate important

negative externalities that, in turn, may affect growth adversely, particularly in overcrowded regions.

Township and Village Enterprises proved to be a highly significant source of economic growth. The credibility of our conclusions concerning the role of TVEs is further enhanced by the fact that our results are obtained in the context of a standard, cross-country growth model. Recent growth studies have focused on the impact of social and political factors on growth, namely the relationship between “social arrangements,” incentives and growth. This study extends this literature by suggesting that Township and Village Enterprises have contributed significantly to China’s economic growth.

Lastly, we found strong evidence of convergence, which is also consistent with cross-country growth studies. One interesting research line of inquiry would be what is driving this convergence.²⁷ Another empirical extension of this work would be to utilize a more sophisticated econometric procedure that allows for endogeneity of the explanatory variables, such as trade.

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Table 1: China's regional economic growth, 1978-1996

Region	Population 1996 (10000 persons)	Real per capita GDP (RMB per person)		Rate of growth 1978-96	GDP per cap. relative to nat. average		
		1978	1996		1978	1996	Change
Zhejiang	4343	353.2	2731.7	673%	0.9	1.6	0.7
Fujian	3261	292.6	2287.5	682%	0.7	1.3	0.6
Guangdong	6961	400.8	2679.9	569%	1.0	1.6	0.5
Shandong	8738	346.0	1951.9	464%	0.9	1.1	0.3
Hainan	734	301.6	1518.6	403%	0.8	0.9	0.1
Guangxi	4589	241.4	1165.8	383%	0.6	0.7	0.1
Xinjiang	1689	337.9	1545.4	357%	0.9	0.9	0.0
Henan	9172	249.3	1149.2	361%	0.6	0.7	0.0
Jiangsu	7110	545.3	2416.5	343%	1.4	1.4	0.0
Yunnan	4042	241.5	1056.0	337%	0.6	0.6	0.0
Anhui	6070	259.0	1102.8	326%	0.7	0.6	0.0
Sichuan	11430	256.5	1055.2	311%	0.7	0.6	0.0
Hubei	5825	356.9	1459.1	309%	0.9	0.8	-0.1
Hunan	6428	307.6	1178.4	283%	0.8	0.7	-0.1
Hebei	6484	391.4	1523.9	289%	1.0	0.9	-0.1
Inner Mongolia	2307	332.4	1221.5	267%	0.8	0.7	-0.1
Jiangxi	4105	295.5	1057.6	258%	0.8	0.6	-0.1
Guizhou	3555	187.7	579.4	209%	0.5	0.3	-0.1
Jilin	2610	412.4	1466.0	255%	1.1	0.9	-0.2
Shaanxi	3543	316.3	949.3	200%	0.8	0.6	-0.3
Shanxi	3109	392.5	1201.6	206%	1.0	0.7	-0.3
Ningxia	521	377.2	1063.4	182%	1.0	0.6	-0.3
Heilongjiang	3728	598.5	1844.1	208%	1.5	1.1	-0.5
Gansu	2467	374.2	828.4	121%	1.0	0.5	-0.5
Liaoning	4116	711.0	2195.3	209%	1.8	1.3	-0.5
Qinghai	488	460.3	1076.4	134%	1.2	0.6	-0.5
Tibet	244	433.0	759.5	75%	1.1	0.4	-0.7
Tianjin	948	1234.3	3327.5	170%	3.1	1.9	-1.2
Beijing	1259	1384.4	3672.3	165%	3.5	2.1	-1.4
Shanghai	1419	2685.7	5852.4	118%	6.8	3.4	-3.4
National	122389	392.7	1717.2	337%			

Sources: *China Statistical Yearbooks*, various issues

Table 2: Ownership Structure of Industrial Production (%)

Ownership	1978	1985	1990	1992	1994	1996
State	77.6	64.8	54.6	51.5	37.3	28.5
Collectives	22.4	32.1	35.6	35.1	37.7	39.4
Individual	0	1.8	5.4	5.8	10.1	15.5
Other	0	1.2	4.4	7.8	12.9	16.6

Source: China Statistical Yearbook, 1997.

Table 3: Determinants of Real Growth Rates by Province

Dependent variable: province's per capita real GDP growth rate

	Coefficient (t-ratios)	Coefficient (t-ratios)
Per capita income in 1978	-0.000033*** (-3.944)	-0.000022*** (-3.411)
Investment share lagged one period	0.0561 (1.278)	0.0753* (1.889)
Openness	0.2023* (1.954)	
Share of foreign direct investment in total investment		0.00032 (0.662)
Population growth rate	-0.6026** (-2.157)	-0.5670*** (-2.658)
School enrollment	0.1889 (0.724)	0.057 (0.236)
Collective output as share of total industrial output	0.1291*** (4.471)	0.1169*** (4.548)
Coal reserves in 1978	-0.0000065 (-1.104)	-0.0000091* (-1.750)
Hydropower resources in 1978	0.00000029 (0.265)	0.00000025 (0.254)
Adjusted R ² – overall	0.55	0.52
R ² – within	0.19	0.13
R ² – between	0.51	0.49
N	370	437

Estimates marked ***, **, and * are significant at the 1%, 5%, and 10% levels.

Table 4: Long-Run Determinants of Real Growth Rates by Province

Dependent variable: province's per capita real GDP growth rate

	Coefficient (t-ratios)
Per capita income in 1978	-0.000029*** (-3.998)
Investment share	0.085* (1.794)
Openness	0.2340** (2.440)
Population growth rate	-1.773* (-1.908)
School enrollment	0.2063 (0.933)
Collective output as share of total industrial output	0.1009*** (3.598)
Coal reserves in 1978	-0.0000054 (-1.116)
Hydropower resources in 1978	0.00000071 (0.770)
Adjusted R ² – overall	0.64
R ² – within	0.63
R ² – between	0.49
N	85

Estimates marked ***, **, and * are significant at the 1%, 5%, and 10% levels.

Endnotes

¹See (Perkins, 1988) for a detailed analysis of this process.

²The concepts of capitalism and socialism are used here in their most common way, i.e. they are defined in terms of private versus nonprivate ownership of the means of production (Hillman et al., 1992)

³TVEs generally refer to enterprises owned by village and township governments (including those leased to individuals). Because of data restrictions those privately owned are often included.

⁴ The constitution, after an amendment in the spring of 1999, now regards the private sector as an “important part” of the “socialist market economy.”

⁵ It should be noted that 1999 saw a fall in FDI for the first time since the beginning of economic reform.

⁶ A fourth centrally administered municipality was established in Chongqing, Sichuan province, in 1997.

⁷ Tian (1999) uses a panel data set for 1978 through 1993 to analyze changes in regional disparities between provinces.

⁸Though reform succeeded first in the countryside, it was attempted first in the industrial sector but with no success (Naughton, 1994b).

⁹ However, in 1994, state units still accounted for three-quarters of investment and 70 percent of bank credit. (*World Development Report*, 1996, p. 46)

¹⁰ It should be noted that SOE losses as a percentage of GDP have been decreasing. Forty percent of the state-owned firms reported losses in 1994 (*World Development Report 1996*).

¹¹Since 1984, collectively as well as privately owned enterprises, located in rural areas, are classified as “rural enterprises” (*Chinese Statistical Yearbook 1989*, p. xxxvi).

¹² The difference between the two is ideologically and politically important, while the former are viewed as small proprietors, the later are viewed as capitalists. The number 8 is (wrongly) attributed to Marx (Xie, p. 458).

¹³ All the TVEs are registered with the Agricultural, Industrial and Commercial Corporation (AICC), which regulates them. Private enterprises *per se* are not registered with the AICC (Chian et al. 1996)

¹⁴Though generalizations are difficult, Dong (1988) described three dominant models of (rural) economic development: the Wenzhou Model, the Jiangsu Model, and the Mixed Model.

¹⁵About 35%-40% of TVEs' profits after taxes are remitted to local governments.

¹⁶Rural enterprises include not only TVEs but also private enterprises.

¹⁷ Our approach is modeled on the authoritative cross-country growth studies by Barro (1991, 1996) and Mankiw, et al. (1992). Tian (1997) also used in this approach to model the role of market mechanisms in China's economic development.

¹⁸ Barro (1996) also used panel data, while Barro (1991) and Mankiw, et al., focused on cross-sectional evidence on long-run average growth rates.

¹⁹ Barro (1991) also uses school enrollment data to measure human capital investment. Barro (1996) instead includes educational attainment rates, while Mankiw, et al., use the share of the population that is of school age.

²⁰ Our focus on the investment rate is standard in cross-country growth studies. For example, see Barro (1996), pp. 22-23.

²¹ For example, see Barro (1991), Barro (1996), pp. 14-15, and Mankiw, et al., pp. 421ff.

²² This is a standard measure of a country's orientation toward international trade. For example, it is used in Frankel and Romer (1999) and many other studies that use data from the Penn World Tables.

²³ The correlation between *OPENNESS* and *FORNINV* is 0.60453, and the correlation between *OPENNESS* and the special economic zones variable is 0.55909.

²⁴ A Hausman test supports the use of fixed effects for time. Results available from authors.

²⁵ For example, data on total investment in fixed assets in 1978 are missing for fourteen provinces and in later years for smaller numbers of provinces, and many observations are missing for Xizang (Tibet).

²⁶ Frankel and Romer (1999) found that "trade has a quantitatively large and robust, though only moderately statistically significant, positive effect on income."

²⁷ Within cross-country studies it has been suggested that convergence may be due to technology transfers (Temple, 1999).