What Makes Regions Grow?
the Case of China

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Abstract

This thesis investigates the determinants of regional economic growth in China. A first look at the real per capita income of rural and urban households confirms that the urban-rural inequalities in China are increasing. However, real per capita income both in urban areas and in rural areas tend to converge. Given the special nature of China's economy, the gradual transition process from a planned economy to a market one is examined, together with the cental government's regional development strategies and reform policies. Both cross-sectional analysis and panel regression approaches are applied to data from 1985 to 2001. Furthermore, a few case studies are done. It is found (1) that geographic factors, development of private sector, foreign investment and quality of human resources are key determinants of regional growth in China; and (2) empirical evidence indicates that the convergence hypothesis held in China during the 1985-2001 period.

1 Introduction

Napoleon once said that China was a giant lion in deep sleep and the whole world would be amazed once it woke up. It did happen. Since China opened up to the outside world in early 1980s and started the transition process from a central plan economy to a market one, the Chinese economy has been growing fast. After the four " Asian tiger" (Hong Kong, Singapore, South Korea and Taiwan), China was regarded as another "miracle economy". Most of the "tigers" were greatly affected by the Asian Financial Crisis in 1997 and slowed down. But China's economy kept expanding at a remarkable pace of over 7% annually. In the past few years, with US economy slowed downed and European economies stagnant, China becomes the bright spot and is praised as the engine for global economic growth.

The respectable performance of China's economy has been drawing lots of attention from academics, who want to make sense of such a Chinese phenomenon. Researchers have been debating among themselves whether the remarkable growth of China's economy is driven by productivity growth or by factor accumulation (physical capital, labor participation and human resources). Chow (1993) argues that capital formation played a critical role in China's economic growth. Wang and Yao (2003) incorporates human capital accumulation into a simple growth-accounting framework by constructing a measure of China's human resource stock for the 1952-1999 period and finds that the growth of total factor productivity (TFP) did make a positive and significant contribution to China's GDP growth after 1978. On the other side, Krugman (1994) claims that China's economy will slow down in the near future since the rapid growth in China depends heavily on massive increases in inputs while improvements in productivity were not significant at all.

Some scholars viewed the highly publicized economic growth miracle in China with skepticism. Young (2000) argues that the improvements in productivity of China's nonagricultural sector since 1978 are not as rosy as the Chinese's authorities claimed. According to Young's calculation, the economic performance in China during the reform period is mediocre.

In recent years, the academic interests in China shifts to regional inequalities. While the nationwide economic growth is impressive, the pace of reform and economic development has been uneven across regions. The disparity between coastal cities and interior areas has become more and more obvious. Lots of scholars have been devoting their attention to the origin and causes of inequalities across regions.

It's generally accepted that the reasons for the poor performance of interior regions include poor economic basis, shortage of capital, low quality of human

resources, closed culture, relatively unfavorable regional development policies dictated by the central government, and poor natural conditions. Various researchers have been emphasizing a few particular factors that affect regional disparity. For example, Bao, Chang, Sachs and Woo (2002) investigates the geographic effects on regional economic growth in China for the 1978-1998 period and finds that geographic factors are statistically significant in explaining the regional inequalities in China. Jones, Li and Owen (2003) uses city-level data to do their regression analysis and concludes that there is much larger variation in growth of real per capita income at city level in China than that was reported in studies based on provincial-level data. They claims that government policies that give preferential treatments to certain cities can account for a big portion of the differences across Chinese cities.

The so-called preferential treatments are closely related with the regional development strategy of the Chinese leadership. Coastal cities were gradually opened up for international trade in early 1980s. Then major cities along the Yangtze River Delta joined the club. Finally all capital cities of inland provinces were opened after 1992. For all these open cities, many favorable policies are implemented to enhance business environment and attract more foreign investment. It was hoped that the rapid economic growth in coastal regions would spillover to the interior regions eventually. However, the expected spillover effects between provinces seem not to work as properly as it was expected to. Brun, Combes and Renard (2002) find that in the short-run spillover effects have not been sufficient to reduce regional inequalities. Fu (2004) argues "FDI-related processing-type exports provided the growth engine for coastal regions, but has only limited linkage with, and weak spillover effects on, the inland regions."

Even though the determinants of regional economic growth and the origin and causes of regional inequalities seem to be different subjects. In essence, they are the same. What makes some regions experience fast economic growth is generally what causes the per capita income of those regions relatively higher. Once those determinants are pinned down, the poor regions could adopt successful practice from rich regions and formulate effective policies to enhance favorable conditions for economic growth to gradually catch up.

In the existing literature, convergence analysis across China's regions is extremely difficult to find. Furthermore, there seems to be no complete quantitative analysis of the general determinants of economic growth in China. All the existing research papers focus on one or two specific factors that affect the economic growth. But nobody seems to have taken a look at the overall picture. Given this observation, I am inspired to do a regional growth analysis for China, following the framework that Barro and Sala-i-Martin (1991) outlined. Such a framework has been used to analyze convergence across US states, European regions, Japanese prefectures, etc. However, China is unique

in a few ways. By 1978, after decades of industrialization, the country was still a largely agricultural society. The distinction between rural and urban residents was deliberately maintained and emphasized by the state. There are strict constraints on labor mobility. The transitional process from a planned central economy to a market one is gradual and uneven. The country is a multi-lingua and multi-nationalities society. The size and geographic factors of various regions might indicate different steady states for the regions.

Bearing those differences in mind, I proceed with my analysis with first taking a look at the real per capita income of rural and urban households in China. Urban-rural disparities has been worsening. However, real per capita income of both urban and rural households across China's 28 regions converged during the 1984-2001 period.

Before I start with regional growth analysis, I reviewed China's economic history before 1949 and major policies and changes during the reform period since politics and economy are intimately intertwined with each other. After the review, I do a cross-sectional growth regression analysis using the provincial-level data from 1985 to 2001. During this sixteen-year period, regions in China are estimated to converge at a speed of 3.84% per year. This result is comparable with the 3.36% per year conditional convergence speed estimated by Cai, Wang and Du (2002) for the 1978-1998 period. Just as economic theories predicted, initial human capital stocks, investment rate, growth rate of labor force and per capita foreign investment are positively related with per capita output growth while population growth, government spending and inflation influence economic growth negatively. Furthermore, the regression results confirm that geographic factors play a very significant role in regional economic growth.

Barro and Sala-i-Martin's framework for regional convergence analysis is based on the assumption that regions of one country tend to have the same or at least similar steady states. However, in China, different regions might have their own steady states. Hence, I do another panel regression analysis, taking fixed effects of various regions into consideration. Under this framework, the speed of conditional β convergence across China's regions during the 1985-2001 period is higher: 5.61% per year. The panel data regression results confirm that government spending, state sector and population growth affect regional economic growth negatively while real per capita foreign investment has positive influence.

The structure of my thesis is as follows. The next section focuses on the convergence of real per capita income of rural and urban households. Section 3 deals with China's economic history before 1949 and the reform and transition process since 1978. In Section 4, growth analysis framework and data are discussed, and my main estimation results are reported. Section 5 contains

estimation results from panel data regressions. Section 6 presents case studies of a few winners and losers. In Section 7 China's experience is compared with that of some other economies and the good and bad practices are discussed. Section 8 concludes.

2 Convergence of income across regions

According to Barro and Sala-i-Martin (2004), "a key property of the neoclassical growth model is its predication of conditional convergence". Such a concept applies "when the growth rate of an economy is positively related to the distance between this economy's level of income and its own steady state". In contrast, absolute convergence applies "when poor economies tend to grow faster than rich ones". Barro and Sala-i-Martin (2004) believes that "absolute convergence is more likely to apply across regions within countries than across countries" due to relative homogeneity in terms of technologies utilized by firms and households of different regions, tastes and preferences of consumers, common central governments, and similar institutional setups and legal systems. Convergence takes place because of diminishing return to capital.

In the literature of economic growth across countries and regions, two different concepts of convergence exist: β convergence and σ convergence. Barro and Sala-i-Martin (2004) claims that β convergence applies "if a poor economy tends to grow faster than a rich one, so that the poor country tends to catch up with the rich one in terms of levels of per capita income or product." σ convergence applies "if the dispersion - measured, for example, by the standard deviation of the logarithm of per capita income or product across a group of countries or regions - declines over time." In the rest of this section, these two concepts of convergence will be applied to check whether the real per capita income across different regions in China converge.

2.1 Data description

Before 1987, there were 29 provinces, provincial level cities and autonomous regions. In 1988, Hainan, previously part of Guangdong Province, became a separate province. In 1997, Chongqing, which used to be part of Sichuan Province, was granted the status of provincial level city. Due to lack of data on rural and urban populations in different regions, it's impossible to incorporate income of Hainan and Chongqing into Guangdong and Sichuan respectively. Furthermore, Hainan and Chongqing are not included in the convergence analysis. Tibet is also not included because of missing data. Therefore, the convergence analysis is applied to 28 regions.

Table 1: Urban-rural disparity ratios in China

Region	1985	1990	1995	2001
Coastal				
Beijing	1.70	1.82	1.93	2.30
Tianjin	1.57	1.54	2.05	2.27
Hebei	1.67	2.30	2.17	2.04
Liaoning	1.52	1.70	1.67	1.73
Shanghai	1.22	1.09	1.69	2.19
Jiangsu	1.81	1.63	1.59	1.61
Zhejiang	1.56	1.56	1.68	1.72
Fujian	1.91	1.77	1.72	1.86
Shandong	1.85	2.00	2.03	1.92
Guangdong	2.03	1.92	2.35	2.27
Guangxi	2.25	2.18	2.93	3.05
Central				
Shanxi	2.00	2.05	2.43	2.35
Inner Mongolia	1.88	1.92	2.12	2.47
Jilin	1.66	1.40	1.54	1.89
Heilongjiang	1.86	1.66	1.65	1.93
Anhui	2.14	2.71	2.69	2.57
Jiangxi	1.69	1.73	1.93	2.04
Henan	2.23	2.36	2.25	2.17
Hubei	1.90	2.01	2.25	2.08
Hunan	1.95	2.34	3.13	2.87
West				
Sichuan	2.31	2.51	2.88	2.71
Guizhou	2.57	2.53	3.23	3.34
Yunnan	2.25	2.69	4.05	4.62
Shaanxi	2.46	2.52	3.03	3.33
Gansu	2.96	3.04	3.34	3.45
Qinghai	2.14	2.17	2.59	2.88
Ningxia	2.31	2.30	2.89	2.58
Xinjiang	1.95	1.95	3.26	3.24

Sources: Author's own calculations using raw data from *China Statistical Yearbooks* published by China's State Statistics Bureau.

Table 2: β Convergence of real income in urban China, 1984 - 2001

Region	$ln(1984)$	$ln(2001)$	average % growth
Coastal			
Beijing	6.95	7.61	3.91
Tianjin	6.60	7.68	6.38
Hebei	6.25	7.40	6.73
Liaoning	6.37	7.22	4.98
Shanghai	6.56	7.83	7.47
Jiangsu	6.63	7.42	4.67
Zhejiang	6.51	7.63	6.62
Fujian	6.43	7.50	6.32
Shandong	6.46	7.43	5.68
Guangdong	6.78	7.78	5.88
Guangxi	6.35	7.34	5.79
Central			
Shanxi	6.32	7.13	4.77
Inner Mongolia	6.33	7.23	5.30
Jilin	6.33	7.16	4.92
Heilongjiang	6.39	7.15	4.49
Anhui	6.50	7.26	4.44
Jiangxi	6.23	7.16	5.48
Henan	6.42	7.29	5.15
Hubei	6.58	7.23	3.83
Hunan	6.45	7.31	5.01
West			
Sichuan	6.41	7.27	5.04
Guizhou	6.40	7.13	4.29
Yunnan	6.46	7.44	5.76
Shaanxi	6.31	7.15	4.98
Gansu	6.46	7.20	4.36
Qinghai	6.53	7.15	3.66
Ningxia	6.39	7.18	4.68
Xinjiang	6.43	7.27	4.95

Sources: Author's own calculations using raw data from *China Statistical Yearbooks* published by China's State Statistics Bureau.

Table 3: β Convergence of real income in rural China, 1984 - 2001

Region	$ln(1984)$	$ln(2001)$	average % growth
Coastal			
Beijing	6.45	6.78	1.90
Tianjin	6.20	6.86	3.91
Hebei	5.78	6.69	5.33
Liaoning	6.10	6.67	3.34
Shanghai	6.64	7.05	2.40
Jiangsu	6.05	6.95	5.27
Zhejiang	6.05	7.09	6.10
Fujian	5.78	6.88	6.46
Shandong	5.97	6.78	4.77
Guangdong	6.02	6.96	5.51
Guangxi	5.50	6.22	4.26
Central			
Shanxi	5.80	6.28	2.82
Inner Mongolia	5.76	6.32	3.33
Jilin	6.11	6.53	2.49
Heilongjiang	6.00	6.49	2.88
Anhui	5.73	6.31	3.40
Jiangxi	5.75	6.45	4.12
Henan	5.65	6.52	5.10
Hubei	5.92	6.50	3.41
Hunan	5.78	6.25	2.77
West			
Sichuan	5.60	6.27	3.96
Guizhou	5.53	5.92	2.33
Yunnan	5.67	5.91	1.40
Shaanxi	5.50	5.95	2.65
Gansu	5.34	5.96	3.64
Qinghai	5.52	6.09	3.36
Ningxia	5.69	6.24	3.20
Xinjiang	5.84	6.10	1.51

Sources: Author's own calculations using raw data from *China Statistical Yearbooks* published by China's State Statistics Bureau.

The data include real per capita dispensable income (DI) of urban households and real per capita net income (NI) of rural households from 1984 to 2001. Nominal data come from various China Statistical Yearbooks. As for the deflators, before 1993, CPIs were not available. Retail price indices for different regions were used instead.

2.2 Urban-rural disparities across regions

Because of China's urban-biased development strategies (to be discussed in detail in next section) disparities of real per capita income in rural and urban areas persist.

As can be seen from Table 1, the urban-rural disparity ratios which are the ratios of real per capita dispensable income of urban households to real per capita net income of rural households fluctuate a lot, but the general trends in the 28 regions are upwards. That is, the urban-rural disparities are getting worse and worse.

For almost all the regions (except Fujian,Jiangsu and Henan), the ratios in 2001 are higher than the respective ones in 1985. The situations in West China are most serious. Out of the six regions with the 2001 ratios higher than 3, five are located in the West: Guangxi(3.05), Guizhou (3.34), Yunnan (4.62), Shaanxi (3.33), Gansu (3.45), and Xinjiang (3.24). As for the speeds of increasing disparities, Yunnan and Xinjiang are the worst. Yunnan's disparity ratio increased from 2.25 in 1985 to 4.62 in 2001, and Xinjiang's, from 1.95 to 3.24. Shanghai, Guangxi, Hunan and Shaanxi belong to the group of second worst performers.

2.3 β convergence across regions

China's economy has been growing fast since its opening up to the outside world in 1978, but not every Chinese benefit equally from their country's remarkable economic performance (see Table 2 and Table 3).

2.3.1 β convergence across urban regions

In 1984, in term of real per capita dispensable income of urban households, urban residents in Beijing, Guangdong, Jiangsu, Tianjin, Hubei, Shanghai, Qinghai and Zhejiang (in descending order) enjoyed the highest living standards. Among these eight regions, six lie in Coastal areas, one in Central China and one in West China. In contrast, average urban residents in Jiangxi,

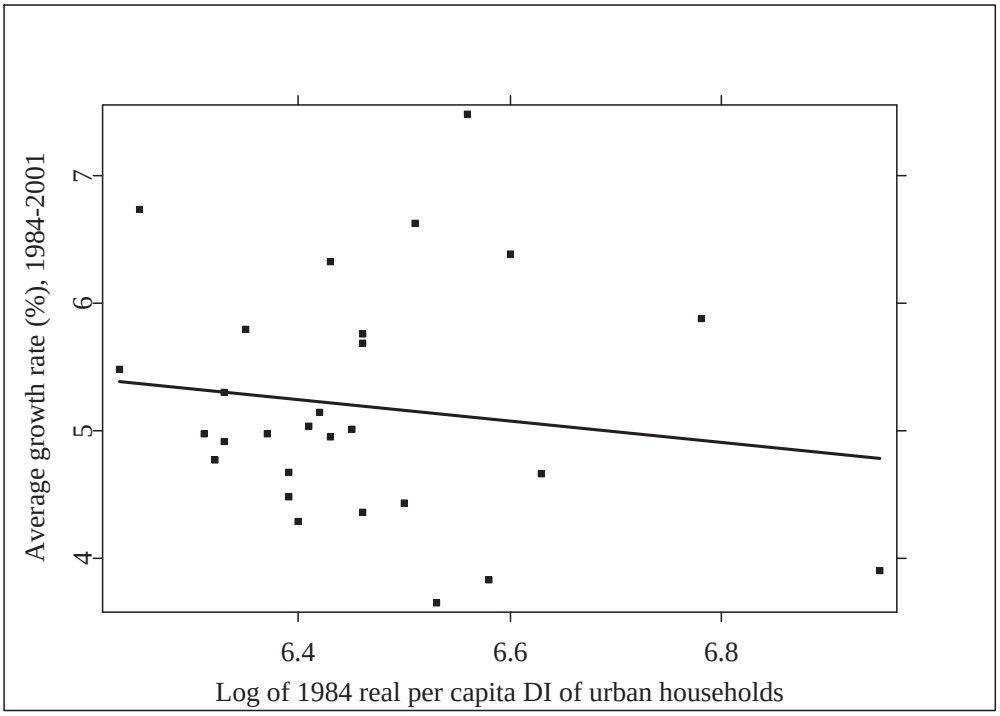

Figure 1: β convergence, urban real per capita income, 1984-2001

Hebei, Shaanxi, Shanxi, Jilin and Inner Mongolia (in ascending order) were the worst off. Four out of these six regions are in Central China, one in coastal areas and one in West China. On average, in 1984, the best off Beijing urban residents got 1038 Yuan (1981 constant price) while the poorest Jiangxi urban residents got only 508 Yuan (1981 constant price). In 2001, this disparity became even wider. On average, the richest Shanghai urban residents received 2526 Yuan (1981 constant price) while their counterparts in Guizhou got only 1248 comparable Yuan. The gap was 530 1981 constant Yuan in 1984. In 2001, it became 1278.

During the period from 1984 to 2001, real per capita dispensable income of urban households had been growing fastest in Shanghai, Hebei, Zhejiang, Tianjin and Fujian (in descending order). All of them are located in coastal areas in China. Average urban residents in Qinghai, Hubei and Beijing (in ascending order) had been witnessing the slowest growth of their real annual income. Urban residents in these three regions were among the best off population in 1984. The best performer, Shanghai, experienced 7.47% average annual growth rate of real per capita dispensable income of its urban households. In contrast, the worst performer, Qinghai, recorded only 3.66%.

As can be observed from Figure 1, real per capita income converges across

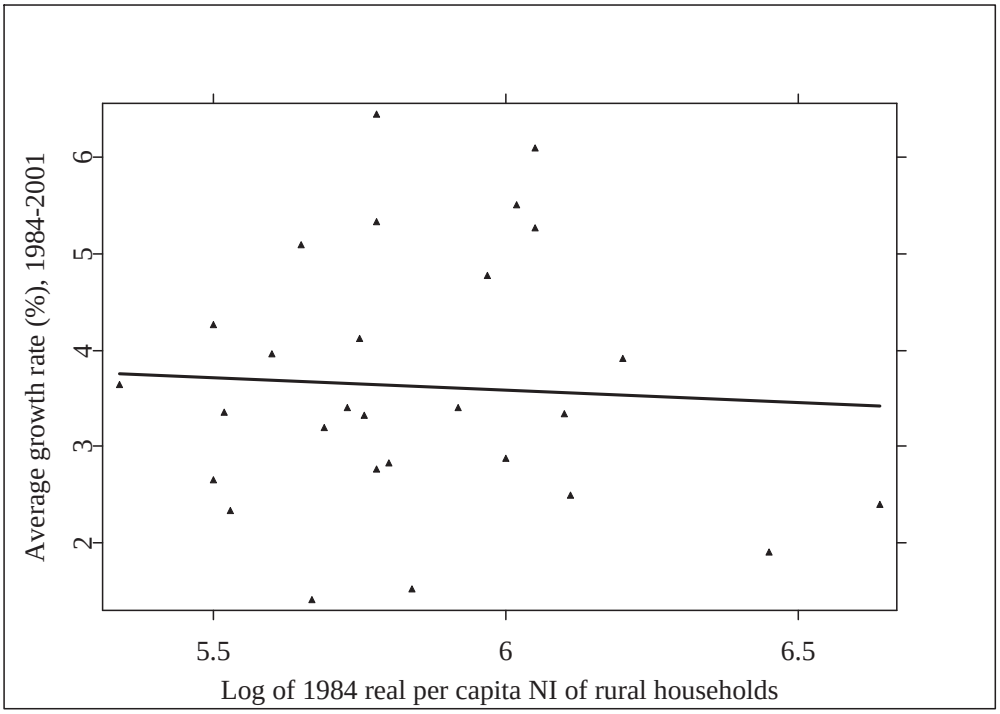

Figure 2: β convergence, rural real per capita income, 1984-2001

urban regions in China. Richer urban regions in terms of 1984 real per capita dispensable income of urban households tend to grow slower, for instance, Beijing, Hubei and Qinghai. The regional economic growth theories predicted that poor regions tend to grow faster so that they could catch up with rich ones. Hebei province can serve as such an example.

2.3.2 β convergence across rural regions

In 1984, average rural residents in Shanghai, Beijing, Tianjin, Jilin, Liaoning, Zhejiang, Jiangsu and Guangdong (in descending order) enjoyed the highest real income. Among these eight richest rural regions, seven lie in China's coastal areas and the rest in Central China. Average rural residents in Gansu, Guangxi, Shaanxi, Qinghai and Guizhou (in ascending order) witnessed the lowest standards of living. All of them except Guangxi which lies in Coastal areas are in West China. The richest Shanghai rural residents got, on average, 765 1981 constant Yuan while the poorest Gansu rural residents received only 209 comparable Yuan. The disparity across rural regions became even more serious in 2001: the best off average Zhejiang rural resident enjoyed real income of 1202 Yuan (in 1981 constant price) while the worst off average Yunnan rural residents had only 370 comparable Yuan. The gap increased from 556 1981

Table 4: Standard deviations of real per capita income, 1984 - 2001

Year	Urban overall	Urban coastal	Urban central	Urban west	rural overall	rural coastal	rural central	rural west
1984	0.153	0.199	0.107	0.065	0.293	0.315	0.146	0.151
1985	0.140	0.190	0.093	0.023	0.252	0.277	0.069	0.128
1986	0.132	0.182	0.092	0.034	0.292	0.291	0.204	0.136
1987	0.141	0.183	0.086	0.052	0.283	0.291	0.105	0.126
1988	0.144	0.160	0.099	0.051	0.286	0.287	0.128	0.134
1989	0.147	0.183	0.096	0.089	0.299	0.299	0.105	0.130
1990	0.147	0.149	0.103	0.077	0.299	0.300	0.136	0.147
1991	0.154	0.135	0.098	0.079	0.290	0.281	0.127	0.140
1992	0.166	0.152	0.104	0.078	0.321	0.281	0.141	0.125
1993	0.187	0.175	0.119	0.089	0.338	0.278	0.113	0.115
1994	0.207	0.195	0.132	0.108	0.339	0.272	0.163	0.111
1995	0.206	0.191	0.117	0.114	0.364	0.251	0.150	0.110
1996	0.209	0.191	0.095	0.138	0.368	0.248	0.158	0.112
1997	0.211	0.179	0.076	0.150	0.350	0.231	0.126	0.132
1998	0.209	0.182	0.080	0.141	0.341	0.213	0.128	0.139
1999	0.208	0.197	0.081	0.114	0.346	0.205	0.122	0.146
2000	0.202	0.192	0.076	0.099	0.346	0.238	0.101	0.138
2001	0.204	0.192	0.065	0.103	0.360	0.238	0.113	0.142

Sources: Author's own calculations using raw data from *China Statistical Yearbooks* published by China's State Statistics Bureau.

constant Yuan in 1984 to 832 in 2001.

During the 1984-2001 period, rural residents in Fujian, Zhejiang, Guangdong, Hebei, Jiangsu and Henan (in descending order) saw the fastest average growth of their real per capita net income. In contrast, their counterparts in Yunnan, Xinjiang and Beijing (in ascending order) witnessed the slowest growth rates. All the six best performers except Henan lie in China's coastal areas. Two out of the three worst performers are in West China. The real per capita net income of rural households in Beijing was very high in 1984. Hence, despite its low average growth rate (the third lowest among 28 rural regions) its rural residents on average were still relatively better off. The best performer, Fujian, enjoyed 6.46% growth rate of the real income of its average rural resident while the worst performer, Yunnan, experienced only 1.4%.

Just as the neoclassical growth model predicted, the real per capita net income of rural households across China's 28 regions actually converged during the 1984-2001 period (see Figure 2). However, the real per capita income of rural households in poor rural regions in West China tended to grow at lower average rates than those in Central and Coastal China. Initially comparatively better off rural residents in Coastal regions witnessed faster average growth rates of their real income. A possible explanation for this is that lots of farmers in Coastal China were engaged in entrepreneur activities after those regions were open to international trade and foreign investment.

2.4 σ convergence across regions

The concept of σ convergence can be used to check whether the dispersion of real per capita income across the 28 regions in China declined over time. Again, we have to examine urban regions and rural ones separately. The overall picture is that rural income dispersion during the 1984-2001 period was wider than urban income dispersion (see Table 4).

2.4.1 σ convergence across urban regions

In coastal areas, during the 1984-1991 period, income dispersion across urban regions tended to decline substantially. In the following three years, it widened again went back close to 1984 level. After that, it fluctuated below the 1984 level.

In Central China, urban income dispersion declined from 1984 to 1987. In the next seven years, it rose steadily and peaked in 1994 (higher than in 1984). Afterwards, it dropped dramatically for three years. The extend of urban in-

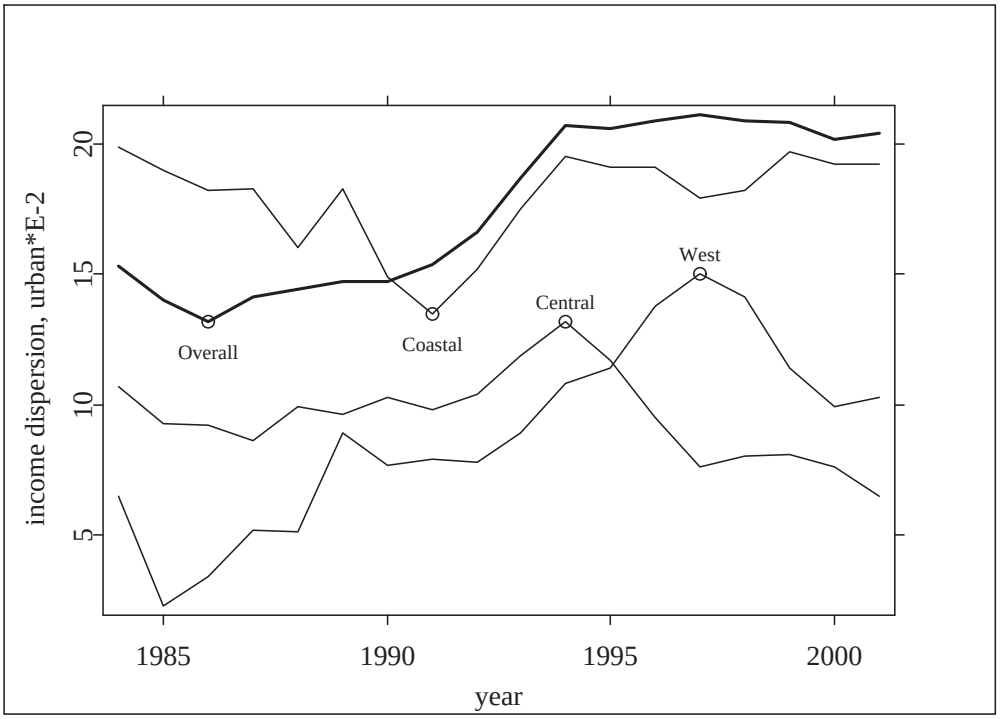

Figure 3: σ convergence, urban real per capita income, 1984-2001

come dispersion in 2001 was much smaller than that in 1984.

In West China, urban income dispersion fell in 1985 and rose consistently (except in 1990) afterwards. It peaked in 1997 and declined in the next three years and rose in 2001. The urban income dispersion level in 2001 was higher than the 1984 level.

As can be seen from Figure 3, income dispersion across urban regions in Coastal China was much higher than that in Central and West China. Nationwide, income dispersion across urban regions tended to rise and peaked in 1994 and remained relatively flat afterwards. However, the extend of urban income dispersion in 2001 was higher than that in 1984.

Judging by the trends (see Figure 3), σ divergence of real per capita across China's urban regions was taking place during the 1984-2001 period. In Central China, the tendency was σ convergence while in both Coastal and West China, it was a mixed process of convergence and divergence.

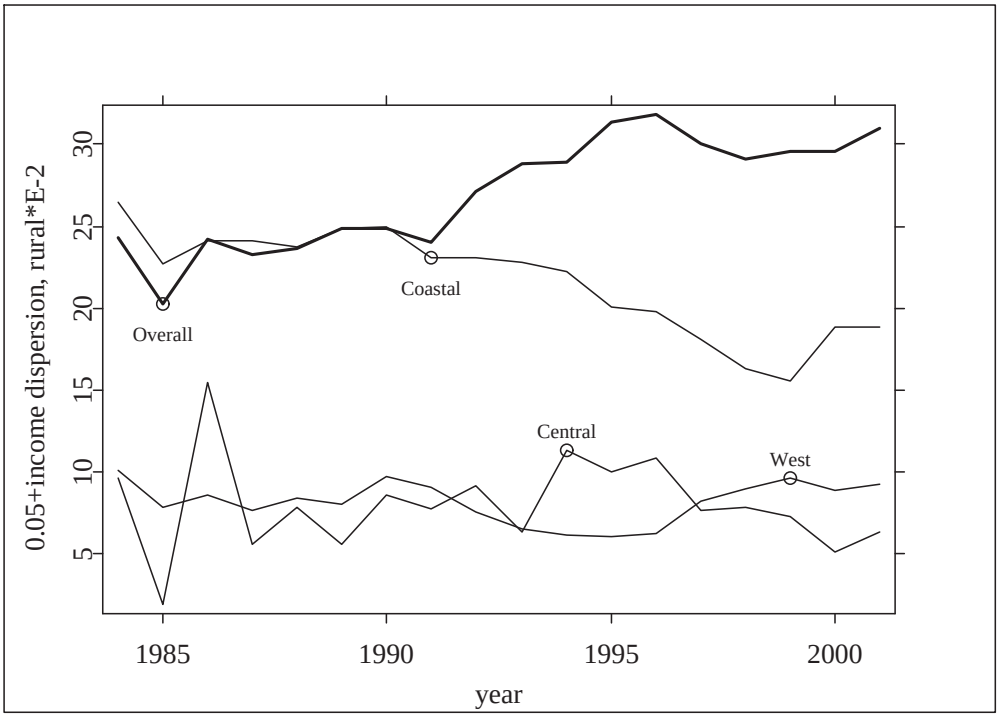

Figure 4: σ convergence, rural real per capita income, 1984-2001

2.4.2 σ convergence across rural regions

In coastal areas, rural income dispersion fell gradually since 1984. It reached bottom in 1999 and rose again afterwards. However, the extend of income dispersion in coastal rural areas in 2001 was lower than that in 1984.

In Central China, rural income dispersion fluctuated a lot. In 1985 real per capita rural income across the 28 regions was almost the same. In 1986, regional disparities became more obvious. During the 1994-1996 period, rural income dispersion levels were above the initial 1984 level. Fortunately, after 1996, it declined and in 2001 its level was lower than that in 1984.

In West China, the general trend of rural income dispersion during the 1984-1996 period was downwards. After 1996, it rose, but the situation in 2001 was better than in 1984.

As can be observed from Figure 4, rural income dispersion in coastal areas was much wider than that in Central and West China. Nationwide income dispersion across urban regions tended to rise. The situation in 2001 was worse than in 1984.

From Figure 4, we can see that σ divergence of real per capita income across China's rural areas was taking place during the 17 years period from 1984 to 2001. In coastal rural areas, σ convergence was happening. In rural areas in both Central and West China, it was a mixed process of divergence and convergence.

3 Market economy in China? Not yet

The origin and evolution of rural-urban disparity is closely related with the development strategies of the Chinese government. The pace and mechanism of reform and transition from a plan economy to a market one greatly affected the economic growth in China's regions. Therefore, in order to make sense of the regional growth patterns in China, it's necessary to have a good understanding of the geographic and historical factors that determine the comparative advantages of different regions and what's more important, the government policies that directly influence the regional economic growth.

3.1 Geographic differences across regions in China

China is big country with a territory of 9.6 million square kilometers with climate ranging from temperate to subtropical. But most of the land in China is hilly and mountainous. Despite its large size, the country is poorly endowed with arable land.

Topographically speaking, China is a "three-step staircase stepping down from west to east"[1]. The highest step is the Qinghai-Tibet Plateau with 4000 meters above the sea level in the southwest. The central regions form the second step, consisting of highlands and basins with elevation of 1000-2000 meters. The eastern regions lie in the lowest step. These regions are close to coastlines and seaports and most of their land is flat. The climate in the eastern regions is also more favorable, warmer and with more precipitation.

Due to the geographic differences, the eastern regions are traditionally important bases for agriculture and commerce and their population densities are high. The western regions are richly endowed with mineral resources, but the mountainous landscape makes it very costly for the people in these regions to explore those endowments. The natural conditions in the west are poor and the climate harsh, therefore, those regions are sparsely populated and historically speaking, they were the poorest.

[1] Bao, Chang, Sachs and Woo, 2002.

3.2 Economic development in China before 1978

Before the Opium War in 1840, China traditionally was a closed feudal agricultural society. Its economic activities initially centered in the interior provinces along the Yangtze River and the Yellow River, where agricultural productivity was high. Later on, due to pressure of expanding population and frequent wars in the northern region, much of the Chinese population moved to the southeast coastal regions.

After the Opium War, Western powers forced the Chinese government of Qing Dynasty to open coastal ports for trade and made footholds in coastal cities such as Hong Kong, Shanghai, Guangzhou and so on. Along with military invasion and occupation, western powers also brought capital and modern technologies into the occupied port cities and their neighboring areas. The coastal regions experienced substantial development in international trade and hence their economies grew. Furthermore, large number of local entrepreneurs emerged.

After the Chinese Communist Party took power in 1949, the development of a modern capitalist economy in the southeast coastal regions was stopped. During Mao's era, investment in coastal regions was restricted since the coastal regions were expected to be the frontier for a military confrontation with the capitalist USA and its allies. In addition to the restrictions on investment in coastal regions, many factories were relocated from coastal regions to the hinterland during the 1960s and 1970s[2]. Those relocated factories were basically unproductive, due to (1) lack of infrastructure such as railroads, highways, water and electricity supplies, etc; and (2) no easy access to markets of raw materials and final users.

Before 1978 the Chinese leadership regarded industrialization as the most important method to enhance economic development. China's industrialization was heavy-industry-oriented. In order to accelerate the pace of industrialization, the state implemented the "price scissors" system, which was after the Soviet model in the 1920s[3]. Under this system, the prices of raw materials including agricultural products were kept artificially low while the final consumption goods were highly priced. The large industrial surpluses generated by deliberately low inputs and high outputs prices were then used to fund industrial development. Meanwhile, household registration system ("hukou" in Chinese) was introduced. Everything was tied up with "hukou". Food and all the other necessities were rationed accordingly.

The Chinese authorities intended to develop a modern industrial sector in

[2]Bao, Chang, Sachs and Woo, 2002.
[3]Young, 2000.

urban areas. Consequently, the development strategies were heavily urban-biased. Urban residents had equal access to low-priced food and other necessities. Almost all urban residents of working ages were guaranteed lifetime jobs ("iron rice bowl") at state- and collectively-owned working units. Furthermore, those working units also provided their employees many favorable social services, for instance, cheap housing, free health care, funeral services, retirement pensions, disability compensation, etc. On the other side, rural residents engaged in agriculture were effectively tied to the land because they were compensated according to the working hours they were credited with and they had to pay high prices for everything if they moved to urban areas. Rural residents got just subsistence income and had to take care of themselves in all aspects of their lives.

Through the "price scissors" system and restrictions on labor mobility, the state extracted massive amounts of resources from agriculture[4] to speed up the industrialization process and as a result, city dwellers were greatly benefited at the expenses of farmers.

3.3 What's going on in China since 1978

As far as uneven economic development across regions in China is concerned, it is closed related with the transition mechanism and the regional development strategies that the Chinese central government has adopted.

3.3.1 Gradual transition process

The Chinese leadership opted to ease state control on its economy gradually, instead of adopting a "big bang" approach. After reform started in China in 1978, the Chinese authorities proceeded with the agricultural sector. The household responsibility system was experimented in a few counties in Anhui and Sichuan provinces. This system was implemented nationwide after it turned out to be a success story. Farmers nationwide were motivated to work hard and productivity in the agricultural sector improved.

After reform in agricultural sector was finished by 1984, the Chinese central government turned their attention to other fields, such as gradually easing state control on pricing, reform in industrial sector, fiscal decentralization and so on. As for price deregulation, a dual price system was put into place. The state maintained price control only on strategic products. They were priced high or deliberately low based on whether they were final consumption products or inputs for production. Only later on in 1990s were the prices of raw materials

[4] Yang, 2002.

and agricultural products left to market force. By 1994, fiscal decentralization was finished and from then on the local governments take over the tasks of keeping their budgets balanced, managing the enterprises within their territories and what's more important, the central government delegates taxation function to the local governments[5].

During the period from 1996 to 1998, major urban reforms were launched, for instance, restructuring of government agencies, reform of welfare system of state-owned enterprises (SOEs), layoffs from SOEs, etc. The main aim was to make the state sector more efficient. In 1996, the central government launched an enterprise-restructuring plan. The key point was to shift the heavy burdens of welfare provision obligations from enterprises to social insurance agencies and individuals. Despite all those efforts, China's state sector is still not in good shape. Most SOEs are not as competitive and profitable as their private counterparts. State banks are loaded with bad debts due to their policy lending to SOEs. In many regions, especially in West China, SOEs remain the major employers[6], hence, the state is hesitating to push for dramatic changes in the state sector in fear of social instability caused by massive layoffs. The transition will be even more gradual.

3.3.2 Major development policies

As far as government policies designed to enhance economic development are concerned, the Chinese leadership has also been opting for gradualism. New policies are experimented in coastal cities, and then effective policies are gradually extended to all provinces.

Since 1978 the most important policy for economic development has been the open door policy. With such a policy, openness to foreign trade and development of regional comparative advantages were emphasized. The Chinese leadership put priority on economic growth, even at the expense of some equity in the short-run. The state head, Deng Xiaoping, instructed that a small group of people should be allowed to get rich earlier so that later on they can help make more people better off.

Under this guideline, in 1979, the state set up 3 Special Economic Zones (SEZs) in Guangdong province. One year later, another one was set up in Fujian province. The economic basis in these two provinces was in better shape, compared with other regions. Furthermore, given the geographic factors and their previous engagement in foreign trade before 1949, they had comparative advantages in attracting foreign direct investment (FDI) and specializing in foreign

[5]Li, Qiu and Sun, 2003.
[6]Fang, Zhang and Fan, 2002.

trade. In 1984 the central government opened up 14 coastal cities including Shanghai, Tianjin, 2 cities in Zhejiang province (Ningbo and Wenzhou), 1 in Fujian (Fuzhou), 2 in Guangdong (Guangzhou and Zhanjiang), 1 in Guangxi (Beihai), 1 in Liaoning (Dalian), 1 in Hebei (Qinghuangdao), 2 in Shangdong (Yantai and Qingdao) and 2 in Jiangsu (Lianyungang and Nantong).

Those open cities were granted considerable autonomy, and furthermore, they enjoyed superior tax treatment and received preferential resource allocations. The state invested heavily to improve the infrastructure in these open cities and implemented many favorable policies there to enhance their attractiveness to foreign investors.

Most of those open cities are great success stories. With their close ties with Hong Kong, Taiwan and many other overseas Chinese located in other Asian countries, those open coastal cities have been drawing great amount of FDI and specialized in the processing export industry. They also draw lots of talented and well-educated people as well as rural surplus labor from other regions.

It was hoped that the rapid economic growth in the coastal regions would spillover to inland sooner or later. In early 1990s, the Chinese authorities started to open up major cities in inland provinces. By 1994, all capital cities in the interior regions were eventually opened up. In early 2000s, the Western Development program was launched. The state allocates special funds to the western regions to improve the infrastructure there and granted favorable policies to those areas in the hope that foreign investors as well as enterprises from coastal and central regions would be motivated to set up business there. However, due to unfavorable natural conditions, the economies in West China still lag behind. Overall prosperity still looks to be a wonderful dream that is impossible to come true. This mission will take many generations to accomplish.

Up to now, over 25 years after China started the reform process, its economy is still not truly a market one. Given China's WTO membership, China is surely becoming opener and more market-oriented. But the bottom line is that the Chinese authorities want to develop a market economy with Chinese characteristics. In other words, the Chinese economy will remain a mixture of plan and market economies in the foreseeable future. The state will continue playing an important role in the economy. In terms of transition to a pure market economy, there is still a long way to go.

4 Cross-sectional growth regression

An empirical analysis of average growth rates of real per capita GDP across China's 28 regions will be conducted in this Section. The growth analysis covers the period from 1985 to 2001 and it is based on the empirical framework advocated by Barro and Sala-i-Martin[7].

4.1 Empirical framework

Barro and Sala-i-Martin's empirical framework "relates the real per capita growth rate to two kinds of variables: first, initial levels of state variables, ... and second, control or environmental variables (some of which are chosen by governments and some by private agents)".

The initial levels of state variables include the initial physical capital stock and initial human capital stock in the forms of educational achievement and health. In this analysis, initial real per capita GDPs are used to be the proxy for the initial stocks of physical capital for the 28 regions.

As for control and environmental variables, the following are generally used in the growth analysis: initial educational achievement (average years of schooling), investment rate (regional investment in fixed assets net of depreciation divided by GDP), labor growth rate, regional population growth rate, share of government consumption in a region's GDP, regional inflation rate, and a coastal dummy variable (as a proxy for favorable geographic factors).

Given the special nature of China's economy, the following variables are used to represent the extent of central planning in different regions: the share of employment in primary industry (agriculture including forestry, fishing, water conservancy and animal husbandry), size of state sector (the ratio of persons employed in state units to total persons employed in a region), the extent of international openness (total values of foreign trade divided by GDP in a region), and real per capita foreign direct investment (FDI) and other foreign investment.

Although China embarked on the road to become an industrialized country for a few decades, it is nevertheless a largely agricultural society. In many provinces, the primary industry plays an important role in the local economy. For a few of them, it is actually the backbone. Given the strategic importance of the primary industry, the state still plays a key roll in this sector and there is quite a bit of central planning in this sector. It's not easy for farmers to get engaged in other sectors. When a farmer wants to set up his own business, he

[7] Barro and Sala-i-Martin, 2004.

gets no loans from state banks and has to face red tapes. In addition to that, there are many restrictions on the movements of rural labor force, for instance, urban employers are usually required by regulations to hire local residents only, it's extremely difficult and expensive to get children with rural household registration enrolled in urban primary and secondary schools, etc. The variable, the share of employment in the primary industry, to some extend, represents the industrialization process in China's regions.

As for the second planned economy variable, it could be interpreted to indicate the role the state sector plays in China 's regions. Before 1978, everything was state-controlled. Since reform started in China, private ownership was not taboo any more and many SOEs were privatized. Now in China, there are all kinds of enterprises, for instance, cooperative, private enterprises, joint ventures, wholly foreign owned enterprises, etc. Since state sector employees include both state employees and those employed by SOEs, it's impossible to separate the privatization effect from the data. However, it is generally agreed that the state sector is less efficient than private sectors in terms of capital allocation and utilization. Hence, the size of state sector is expected to affect economic growth negatively.

The foreign investment variable (including FDI and other foreign investment) can serve as a good indicator for government development policies and geographic factors since FDI tends to flow into regions with favorable conditions (policies, natural endowments and infrastructure) for foreign investment. Chinese firms are keen to go after FDI by looking for JV partners since advanced foreign technologies, know-how, and management skills usually come hand in hand with FDIs. This variable should be positively related with economic growth.

In the foreign trade field, the "invisible hand" doesn't carry its full weight in China yet. Except for JVs and wholly foreign owned enterprises, licenses and quotas for imports and exports are the necessities. They are all state-controlled. According to international trade theories, the opener an economy is, the faster it grows. But this might not necessarily apply in China.

4.2 Data

All the raw data are from China Statistical Yearbooks. Data for Hainna and Chongqing are incorporated into those for Guangdong and Sichuan respectively. Tibet is not included in the analysis due to lack of data. Therefore, the growth regression is done for a total number of 28 regions in China.

Regional GDP data are available since 1988. For the 1985-1987 period, data

on Gross Products of Society are published by China's Statistics Bureau. The regional GDP data from 1985 to 1987 are calculated based on the corresponding regional ratios of 1988 GDP to 1988 Gross Products of Society in China. Data for foreign trade in China's regions are available from 1992 on. Other missing data are treated as such. Regional CPIs are used as deflators.

Data on regional foreign trade and FDI are dominated in dollar while all the other value data are in Chinese Renminbi (RMB) Yuan. To calculate the openness ratio, average exchange rates of Chinese RMB Yuan against US dollar are used to convert the dollar-dominated foreign trade data into RMB-dominated data.

4.3 Growth regression models

The concept of unconditional convergence can be represented by the following basic equation[8]:

$$\frac{1}{T}ln(y_{i,t}/y_{i,t-T}) = a + \beta ln(y_{i,t-T}) + \varepsilon_i$$

$y_{i,t}$ is real per capita GDP in region i at time t. a is a constant term and ε_i, an error term. Negative β implies unconditional β convergence. According to the neoclassical growth theory, a is influenced by the rate of technological progress and the steady state growth rate of real per capita GDP[9]. β represents the speed of convergence.

Unconditional convergence happens when all regions converge to the same steady state values. This is based on the assumption that regional economies within a country do not differ significant in their technological levels, investment ratio, industrial structure an other structural factors since these regions share a common central government and have similar institutional setup and the same legal system.

By comparison, the concept of conditional convergence can be represented as follows[10]:

$$\frac{1}{T}ln(y_{i,t}/y_{i,t-T}) = a + \beta ln(y_{i,t-T}) + A^T X_i + \varepsilon_i$$

where X_i is a vector of all the control and environmental variables and A is the associated vector of coefficients. When β is less than zero, conditional β convergence occurs. It is labelled as "conditional" because regional economies

[8]Yao and Weeks, 2000.
[9]Barro and Sala-i-Martin, 2004.
[10]Yao and Weeks, 2000.

converge to different steady states, given different fundamentals.

4.4 Regression results

The above mentioned regression models are applied to 1985-1991, 1991-2001 and 1985-2001 data respectively, hence, three sets of results are obtained. The generally used control and environmental variables are combined to form the basic model. The full model include the planned economy variables reflecting the special nature of China's economy.

4.4.1 Results for the 1985-1991 period

By 1985, China had finished reforms in the agricultural sector, namely, the household responsibility system was implemented all over rural areas in China and agricultural productivity had been improved greatly. Step by step, China's central government opened up a number of cities for foreign trade and investment. Before 1992, those open cities were concentrated in coastal regions.

Unconditional β convergence of real per capita GDP was taking place across the 28 regions in China (see Table 5). The average speed of convergence is 1.76%. In contrast, the speed of conditional β convergence is higher (see Table 6 and Table 7). With the basic growth regression model, it is 3.54%, and with the full model, 5.98%.

Chen and Fleisher (1996) finds evidence of both unconditional and conditional convergence of per capita income during the 1978-1993 period. Their estimated unconditional convergence speed is 0.9% per year and their conditional convergence speed, 5.7% per year.

As can be observed from Table 6 and Table 7, most coefficients have the right signs. As expected, initial educational achievement, investment rate, real per capita foreign investment and coastal dummy variable are positively related with the average growth rate of real per capita GDP while the share of government expenditure and inflation rate affect the annual growth rate negatively.

According to the regression results, the sign for labor growth rate is not clear. Economic theory predicts that in an efficient market economy, labor growth rate should be positively related with output growth. In the basic model, the estimated coefficient implies that when labor force increases by 1%, real per capita GDP grows by 0.204%. But the estimated result from the full model indicates that real per capita GDP should actually decrease by 0.133%. A possible explanation for this is that China's regional economies are not operat-

ing efficiently and in most regions, the physical capital stocks are relatively low.

The signs for estimated coefficients of population growth rate in the basic and full models are contradictory as well. It is generally accepted that population growth affects economic performance negatively since part of social resources have to be diverted from production to sustain the increased population. But during the 1985-1991 period, there was something quite unusual going on in China. After the Chinese government opened up coastal cities, people (including rural laborers, college graduates and well-educated urban employees) from other regions flocked to those cities. The favorite destinations for those immigrant workers include Shenzhen, Hainan, Guangzhou and Shanghai. Local governments and enterprises in those open cities implemented special policies to attract talented people from other areas. Economies in the host regions were greatly boosted by the immigrant workers. Shenzhen can serve as a typical example. It used to be a fishing village across Hong Kong and is developed into an economic powerhouse practically by immigrant workers from scratch. Meanwhile, the average stocks of physical capital in the home areas got improved as well. As a result, during the 1985-1991 period, population growth is positively related with output growth in the basic model.

As for the planned economy variables, the size of state sector turns out to be positively related with real per capita GDP growth rate. It might be explained by the fact that SOEs get generous loans from state banks and consequently influence the local economies positively despite their inefficiency.

The case with another planned economy variable, the share of employment in the primary industry, is not so straightforward. Compared with the world's developed countries, China's agricultural productivity is very low. Therefore, this variable could be negatively related with output growth rate. However, in some regions, since agriculture is the backbone of the local economies, the size of the primary industry might contribute positively to economic development. During the 1985-1991 period, other things being equal, a 1% increase in the share of employment in the primary industry causes real per capita GDP to decline by almost 0.003%.

4.4.2 Results for the 1991-2001 period

In the 1990s, the Chinese leadership tried to reform the state sector. In the 1994-1996, large number of people were laid off from governmental organization at various levels and SOEs. However, out of fear for possible social instability, many tough measures for state sector reform were not pushed through or postponed. Large SOEs still get preferential allocation of resources despite their inefficiency in allocating and utilizing those resources.

Table 5: Unconditional β convergence regression results

Regressor	1985 - 1991		1991 - 2001		1985 - 2001	
	β	R^2	β	R^2	β	R^2
$ln(y_0)$	-0.0176	0.1338	0.0015	-0.0373	-0.0086	0.0205
	(0.0077)	[0.0201]	(0.0089)	[0.0213]	(0.0069)	[0.0178]

Sources: Author's own calculation using data from *China Statistical Yearbooks* published by China's State Statistics Bureau.

y_0 is the real per capita GDP in a region in the base year of the regression period.

Each column contains four numbers. The first one is the estimated coefficient. Below it, in parentheses, its standard error. To its right, the adjusted R_2 of the regression. Underneath the adjusted R_2, the standard error of the equation.

Table 6: Conditional β convergence regression results, basic model

Regressor	1985 - 1991		1991 - 2001		1985 - 2001	
	β	R^2	β	R^2	β	R^2
$ln(y_0)$	-0.0354	0.4656	0.0062	0.7493	-0.0159	0.6258
	(0.0191)	[0.0158]	(0.0141)	[0.0105]	(0.0130)	[0.0101]
$ln(Edu_0)$	0.0119		-0.0013		0.0033	
	(0.0310)		(0.0218)		(0.0222)	
Investment	0.2742		0.0350		0.0859	
	(0.1249)		(0.0925)		(0.1035)	
Labor growth	0.2042		0.6637		0.2643	
	(0.5359)		(0.3606)		(0.4968)	
Population	0.4878		-1.6954		-0.0897	
	(0.9723)		(0.9375)		(0.9879)	
Gov. spending	-0.4676		-0.4497		-0.4622	
	(0.2210)		(0.1374)		(0.1608)	
Inflation	-0.3949		-1.2807		-1.3019	
	(0.7474)		(0.4465)		(0.5528)	
Coastal dummy	0.0258		0.0144		0.0203	
	(0.0078)		(0.0059)		(0.0054)	

Sources: Author's own calculation using raw data from *China Statistical Yearbooks* published by China's State Statistics Bureau.

Edu_0 is the average years of schooling of the population in a region in the base year of the regression period.

Table 7: Conditional β convergence regression results, full model

Regressor	1985 - 1991		1991 - 2001		1985 - 2001	
	β	R^2	β	R^2	β	R^2
$ln(y_0)$	-0.0598	0.5501	0.0219	0.7369	-0.0384	0.6297
	(0.0319)	[0.0145]	(0.0250)	[0.0107]	(0.0256)	[0.0109]
$ln(Edu_0)$	0.0103		0.0222		0.0050	
	(0.0312)		(0.0273)		(0.0245)	
Investment	0.3134		0.0396		0.1782	
	(0.1204)		(0.1136)		(0.1163)	
Labor growth	-0.1331		0.5520		0.4687	
	(0.5212)		(0.4118)		(0.5096)	
Population	-0.7742		-1.4511		-1.8121	
	(1.0346)		(1.4818)		(1.3895)	
Gov. spending	-0.4715		-0.3910		-0.5098	
	(0.2110)		(0.1899)		(0.1809)	
Inflation	-0.9581		-1.4173		-1.0974	
	(0.7268)		(0.5462)		(0.5823)	
Coastal dummy	0.0196		0.0096		0.0161	
	(0.0092)		(0.0080)		(0.0073)	
Primary sector	-0.0027		0.0640		-0.0007	
	(0.0738)		(0.0518)		(0.0663)	
State sector	0.0164		-0.0291		0.0566	
	(0.0578)		(0.0735)		(0.0567)	
FDI	0.0043		0.0006		0.0010	
	(0.0017)		(0.0005)		(0.0006)	
Openness			-0.0222			
			(0.0257)			

Sources: Author's own calculation using raw data from *China Statistical Yearbooks* published by China's State Statistics Bureau.

Since 1992, all the major cities in interior provinces have been opened up. As disparities between coastal cities and hinterland areas became more and more obvious, the central government tried to promote the development of West China by implementing the west development strategy. However, the gaps continue to widen.

During this ten-year period, unconditional as well as conditional β divergence were taking place. As can be seen from Table 5, Table 6 and Table 7, the speed of unconditional divergence is 0.15%. As for the speed of conditional divergence, it is 0.62% with the basic model and 2.19% with the full model.

As for the estimated coefficients, most of them have the right sign. However, in the basic model, the variable representing initial human capital stock, the average years of schooling, has the wrong sign.

During this period, population growth affects real per capita GDP negatively. A 1% increase of population results in a 1.69% decrease in output growth rate in the basic model and a 1.45% decrease in the full model. Also as expected, labor growth rate and real per capita GDP growth rate are positively related.

Compared with the previous period, the effect of inflation rate is much more significant. In the basic model, a 1% increase in the inflation rate is estimated to reduce the real per capita GDP growth rate by 1.28%. In the full model, it leads to a 1.41% decrease. In contrast, investment is estimated to play a much less important role. In the basic model, when the investment rate is increased by 1%, the real per capita GDP growth rate is estimated to increase by a minor 0.035%. In the full model, things do not improve much. The estimated increase is about 0.040%.

As for the planned economy variables, the primary industry variable has a positive sign while the state sector variable has a negative sign (as predicted by the efficiency theory). Real per capita foreign investment became less significant during the 1991-2001 period. A 1 USD (1981 constant price) increase causes only a 0.06% rise in real per capita GDP. During the 1985-1991, it is a 0.43% increase. The estimated coefficient for the international openness variable is negative. Contrary to international trade theories, the more a region gets engaged in foreign trade, the slower the real per capita output grows. Since foreign trade in China is still subject to state control to a large extent, such a result may not be so surprising.

4.4.3 Results for the 1985-2001 period

Throughout the sixteen years long period, unconditional as well as conditional β convergence were taking place (see Table 5, Table 6 and Table 7). The speed of unconditional convergence is 0.86% while the speed of conditional convergence is 1.59% in the basic model and 3.84% in the full model.

Initial educational attainment and investment rate are positively related with real per capita GDP growth, but the estimated coefficients are not so significant. The growth rate of labor force is also positively related with output growth and the estimated coefficients are significant. The signs of population growth rate, government consumption and inflation are right and the estimated coefficients are significant. The "crowding out" effect of government spending is confirmed by the regression results. During this period, a 1% increase in government expenditure ratio is estimated to cause real per capita GDP to decline by 0.46% in the basic model and 0.51% in the full model.

Based on the regression results for coastal dummy variable, the geographic location plays a very important role. Holding other variable constant, coastal regions grow faster than interior areas at an estimated annual speed of 1.61%.

Among the three planned economy variables, the estimated coefficient of the share of employment in primary industry is negative and the state sector variable has a positive sign. Real per capita foreign investment is positively related with output growth, just as expected. An increase of one 1981 USD leads to a 0.1% rise in real per capita GDP.

5 Panel data approach

With the cross-sectional approach used in the previous section, initial conditions matter. Since the economic growth profiles of China's regions reflect both initial conditions and the dynamics of China's transition process from the formerly planned economy to a market economy[11], cross-sectional regression is an appropriate approach to analyze China's regional economic growth.

However, this approach has some certain shortcomings. Islam (1995) argues that the bias generated by the correlation of omitted country- (region-) specific technology effects and the technological growth rate in steady state biases the convergence speed parameter downwards. Furthermore, according to Yao and Weeks (2000), "there may be additional problems due to endogeneity of control variables." China is the most populous country in the world and among

[11] Yao and Weeks, 2000.

its regions, there are strong geographic disparities in resource endowments, living standards and other determinants of economic growth. Since the reform started in China in early 1980s, the regions across China haven't has the same access to the same technologies and know-how. In fact, across the Chinese regions, there exists heterogeneity in both initial technology and the rate of technological progress.

Yao and Weeks believes that "The panel data approach initiated by Islam (1995) and CEL (1996) has potential advantages over the cross-sectional method in overcoming these two problems." Therefore, in this section, this approach is used to examine the economic progress across China's 28 regions during the 1985-2001 period.

5.1 Panel data regression framework

The growth equation is based on the framework proposed by Barro (1991), modified to reflect the special nature of China's economy and the regional development strategies and policies implemented by its central government:

$$\text{Growth}_{i,t} = \beta ln(y_{i,0}) + A^T X_{i,t} + \phi_i + \varepsilon_{i,t}$$

where the subscript i refers to the regions, t refers to time, $ln(y_{i,0})$ is log of initial real per capita GDP in region i, X is a vector of other explanatory variables including government expenditure rate, labor growth rate, population growth rate, investment rate, inflation, the share of employment in primary industry, the size of state sector and real per capita foreign investment, A is the relevant coefficient vector, ϕ_i is region-specific effect, which is a composite of unobservable region-specific factor representing the combined effect of initial technology difference, factor endowments, geographic factors and institutions[12], $\varepsilon_{i,t}$ is the error term.

The data set is a panel of 28 regions covering the following periods: 1986-1989, 1990-1993, 1994-1997, and 1998-2001, yielding 112 observations. The variables are averaged over each of the four periods[13]. The initial levels of real per capita GDP are those in 1985, 1989, 1993 and 1997 respectively. The growth equation is estimated with a panel estimation technique that allows us to control for unobserved regional heterogeneity[14].

[12] Yao and Weeks, 2000.

[13] Brun, Combes and Renard (2002) adopt a similar approach, but they divide their data into six periods, each covering three years.

[14] Härdle, Klinke and Müller, 2000.

Table 8: Panel regression results, fixed effects model

Regressor	Coefficient	SE	t-value
lny_0	-0.056099	0.01375	-4.079
Gov. spending	-0.33771	0.09605	-3.516
Labor growth	-0.10919	0.3118	-0.350
Pop growth	-1.3724	0.4293	-3.197
Investment	-0.00010208	0.07262	-0.001
Inflation	0.91708	0.08669	10.578
Primary industry	-0.20948	0.08864	-2.363
State sector	-0.17417	0.0452	-3.853
Foreign investment	0.00094806	0.0003225	2.940
Constant	0.57322	0.1496	3.832
R^2:	0.8595		

Note: All regressors are correlated with province-specific effects.

Table 9: Panel regression results, general random effects model

Regressor	Coefficient (OLS)	SE	t-value
lny_0	-0.013812	0.009717	-1.421
Gov. spending	-0.39587	0.1023	-3.871
Labor growth	0.54772	0.3199	1.712
Pop. growth	-1.9298	0.4088	-4.721
Investment	0.055461	0.05401	1.027
Inflation	0.97005	0.06793	14.279
Primary industry	0.0036934	0.05166	0.071
State sector	-0.046263	0.04703	-0.984
Foreign investment	0.00094129	0.000392	2.402
Constant	0.11929	0.092	1.297
R^2:	0.8981		

5.2 Panel data regression results

As can be seen from Table 8, conditional β convergence was taking place in China during the 1985-2001 period. And indeed, just as Islam (1995) argued, the speed of conditional β convergence estimated using panel regression method is much higher than those obtained with cross-sectional regression approach: 5.61% per year vs. 3.84% per year. However, this result is still lower than what Brun, Combes and Renard (2002) obtained. They find that provinces in China converged at a speed of 6.9% per year during the 1981-1998 period. Such a difference in convergence speed is justifiable since log of real per capita GDP in 1981 is surely much lower than that in 1985 and convergence speed is negatively related with initial level of output.

As expected, public sectors (government spending and state sector) affect economic growth in a region negatively (see Table 8). When a regional government spends an additional 1% of the regional GDP, it takes 0.33 percentage away from the regional economic growth rate.

As can be observed from Table 8, the negative influence of population growth is quite significant: a 1% increase in a region's population results in a 1.37% decline in economic growth rate. The investment rate is also estimated to affect economic growth negatively, but its coefficient is not significant.

It is again confirmed that the amount of foreign investment a region attracts has positive influence on its economic growth: a 1 USD (1981 price) real per capita foreign investment leads to an increase of 0.09% in economic growth rate.

The only surprise is that the estimate of the variable of inflation doesn't have the expected negative sign. The effect of labor growth is also estimated to be negative, but this might be explained by the fact that the Chinese economy is by and large quite inefficient and the average productivity in China are still very low.

Generally speaking, the results of the fixed effects model are quite satisfactory. The "goodness of fit" of this model is very high, nearly 86%.

In comparison, with a general random effects model (see Table 9), the estimated speed of conditional β convergence during the 1985-2001 period is much lower: 1.38% per year. Just like in the fixed effects model, government spending, size of state sector and population growth rate affect economic growth negatively. But unlike the result in the fixed effects model, labor growth turns out to have positive influence on regional economic growth and the coefficient of the ratio of investment in fixed assets net of depreciation to GDP is not only positive, but also significant: a 1% increase in investment rate results in a 0.055% rise

Table 10: Average growth rates of real per capita GDP, 1985 - 2001

Region	ln(1985)	ln(1991)	ln(2001)	85-91 %	91-01 %	85-01 %
Coastal						
Beijing	7.83	8.24	8.28	6.85	0.38	2.80
Tianjin	7.57	7.94	8.39	6.18	4.48	5.12
Hebei	6.49	7.07	7.77	9.70	6.96	7.99
Liaoning	7.18	7.59	8.00	6.81	4.10	5.12
Shanghai	8.16	8.44	8.74	4.56	3.04	3.61
Jiangsu	6.81	7.38	8.07	9.54	6.92	7.90
Zhejiang	6.81	7.42	8.12	10.04	7.00	8.14
Fujian	6.46	7.17	8.04	11.70	8.75	9.86
Shandong	6.58	7.30	7.97	12.03	6.65	8.67
Guangdong	6.75	7.56	8.06	13.43	5.04	8.19
Guangxi	6.09	6.62	6.99	8.91	3.68	5.64
Central						
Shanxi	6.61	7.03	7.23	6.98	1.97	3.85
Inner Mongolia	6.57	7.01	7.45	7.37	4.34	5.47
Jilin	6.78	7.12	7.57	5.63	4.50	4.92
Heilongjiang	6.85	7.28	7.71	7.16	4.30	5.37
Anhui	6.35	6.70	7.20	5.91	4.94	5.30
Jiangxi	6.28	6.82	7.20	9.12	3.73	5.75
Henan	6.30	6.80	7.43	8.39	6.31	7.09
Hubei	6.63	7.11	7.55	8.11	4.42	5.80
Hunan	6.39	6.82	7.20	7.17	3.84	5.09
West						
Sichuan	6.28	6.84	7.19	9.39	3.54	5.73
Guizhou	6.05	6.53	6.58	8.00	0.53	3.33
Yunnan	6.13	6.80	7.07	11.12	2.68	5.85
Shaanxi	6.39	6.89	7.08	8.39	1.94	4.36
Gansu	6.33	6.76	6.96	7.18	1.96	3.92
Qinghai	6.72	7.08	7.23	6.09	1.46	3.20
Ningxia	6.52	7.00	7.21	7.97	2.17	4.34
Xinjiang	6.65	7.34	7.56	11.49	2.13	5.64

Sources: Author's own calculations using raw data from *China Statistical Yearbooks* published by China's State Statistics Bureau.

in regional economic growth rate. The coefficient of inflation still does not have the right sign and the real per capita foreign investment has similar effect on regional economic growth.

6 Losers and winners

As can be seen from Table 10, during the 1985-2001 period, the best performers in terms of average annual growth rate of real per capita GDP are all in Coastal China: Fujian (9.86%), Shangdong (8.67%), Guangdong (8.19%), Zhejiang (8.14%), Hebei (7.99%) and Jiangsu (7.90%). However, Fujian and Shangdong have relatively low initial real per capita GDP in 1985 and they tended to catch up at a faster speed. On the contrary, the initial average output levels in Guangdong and Zhejiang were relatively high in 1985 and they still managed to record the third and fourth highest average annual growth rates. Hence, Guangdong and Zhejiang are clearly the winners.

As for the worst performers during the sixteen years period from 1985 to 2001, they include Beijing (2.80%), Qinghai (3.20%), Guizhou (3.33%), Shanghai (3.61%), Shanxi (3.85%), and Gansu (3.92%). However, Shanghai and Beijing clearly do not belong to the poor region club since in 1985 Shanghai and Beijing had the highest and second highest level of real per capita GDP respectively and in 2001, Shanghai still kept its champion position and the real per capita GDP level in Beijing was still relatively high. Among the rest worst performers, all except Shanxi (in Central China) are located in West China. The average annual growth rate of real per capita output in Qinghai is the lowest because in 1985 it had the highest initial level in West China. As a result, the obvious losers are Guizhou and Gansu which failed to catch up with other rich regions at a faster pace despite their very low initial levels of real per capita GDP.

During the 1985-1991 period, with their cities open to foreign trade and investment, many of the coastal regions were among the best performers, for instance, Guangdong (13.43%), Shandong (12.03%), Fujian (11.70%), Zhejiang (10.04%), Hebei (9.70%) and Jiangsu (9.54%). Some regions in hinterland areas grew very fast during this period as well: Xinjiang (11.49%), Yunnan (11.12%), Sichuan (9.39%), and Jiangxi (9.12%). They tend to have low initial output levels. As a result, they tend to "catch up" fast at the initial state of economic development. Not surprisingly, in the next ten years, they slowed down and lost the momentum. Due to their comparatively unfavorable fundamentals, their economic growth performance was the least impressive.

Generally speaking, during the 1985-2001 period, in terms of real per capita GDP, coastal regions tended to grow faster than hinterland regions and regions in Central China tended to grow faster than those in West China. In the rest

of this section, case studies will be done for the two top winner and losers to check whether the stories go well with the regression results in the previous two sections.

6.1 Top winner no. 1: Guangdong province

Guangdong province[15] is situated in the southern part of China. It has an area of 180,000 square kilometers, which is 1.87% of the national total. Among the 31 regions (provinces, autonomous regions, provincial-level municipalities) in China, Guangdong province has a long winding coastline, 3,368 km.

Guangdong is located in the subtropical zone and has long summers and warm winters. Only about 15% of its land is under cultivation, so intensive agriculture is practised there. On most of its cultivated land, 2 crops of rice (its main crop) can be grown. Its main cash crops include vegetables, fruits and sugarcane. In particular, fruits are grown in Guangdong throughout the year. The Pearl River Delta and Han River Delta are famous agricultural bases. Thanks to its favorable geographic factors and national endowment, Guangdong was traditionally among the richest regions before reform policies of the central government enhanced its takeoff.

Guangdong has 9 major industries: electronic information, electrical appliances and machinery, petrochemical, textile and clothes, food and drinks, construction materials, paper-making, pharmaceutical and automobile industries.

At the end of 2001, Guangdong had a population of 77.83 million and its population density was over 432 persons per square kilometer[16]. In 1982, urban population accounted for 18.49% of Guangdong's total population, and in 2000, urban population accounted for 53.76% of the total population[17]. Minority nationalities people account for 1.42% of Guangdong's total population in 2000.

Guangdong is close to Hong Kong and Macao. The same dialect, Cantonese, is spoken in both Guangdong and Hongkong. Due to their geographic closeness, Guangdong has been the major supplier of food and other necessities for Hong Kong residents.

As mentioned in section 3, Guangdong province was the earliest region where

[15]Facts and data about Guangdong come from the official web site of Guangdong government, www.gd.gov.cn.

[16]Population data comes from *China Statistical Yearbook 2002*, population density is calculated by dividing population by total area.

[17]Ratios are calculated based on raw data from various *China Statistical Yearbooks*. The 2000 data for Hainan are incorporated into those for Guangdong to make them comparable with the 1982 data.

foreign influences got a fast hold and primary capitalist entrepreneurship came into being. Given its location and its long coastline, Guangdong has a comparative advantage in foreign trade. In addition to that, Guangdong is also the hometown for a large amount of overseas Chinese. The number is about 30 million. Since China opened up to the outside world in 1978 and 3 SEZs and 2 open cities was set up in early 1980s in Guangdong, many of those overseas Chinese poured large amount of foreign investment into this region. As a matter of fact, in 1980s and early 1990s, overseas Chinese from Hong Kong, Taiwan, Mocao and other Asian countries were the major foreign investors in China.

At the early stage, those foreign investments poured into Guangdong focused on labor-intensive processing industry and their technological content was low. Later on, those foreign investors started to move into more capital- and technology-intensive industries. Meanwhile, in Guangdong, township and village enterprises are booming in response to demands for products and services related to foreign trade. In 1989, there were 24,814 township enterprises and 91,073 village enterprises in Guangdong[18]. Huge amounts of rural surplus laborers moved into Guangdong. After more than two decades' development, Guangdong becomes a huge manufacturing site for global outsourcing. All kinds of products are produced there and through its well-operated ports, are sent to destinations all over the world.

Today, Guangdong is still the favorite destination for foreign investment, in particular, FDIs. As can be seen from Table 11, it attracted more than 30% of total foreign investment in China for over two decades. During the 1994-2001 period, it had the highest level of real per capita foreign investment, over 40 USD (1981 price).

As for the industrial structure in Guangdong (see Table 12), the importance of primary sector has decreased while that of tertiary sector has increased. In 1985, primary sector accounted for 37.9% of Guangdong's GDP, and in 2001, it accounted for only 10.8%. Tertiary sector has been developing fast. In 1985, it accounted for 18.6% of Guangdong's total output, and in 2001, it accounted for as high as 40.5% of the total output. By comparison, the expansion of secondary sector is less dramatic: in 1985, the secondary sector's share of output was 43.5% while in 2001, the share was 48.7%.

As for the employment structure in Guangdong (see Table 13), primary sector still plays an important role. In 1985, it accounts for 60.3% of total employment, and in 2001, it still accounted for 41.6%. Secondary sector's share of employment increased from 19.9% in 1985 to 25.9% in 2001 while tertiary sector's share of employment rose from 19.8% to 32.5%. In 2001, Private firms

[18]Data are from *China Statistical Yearbook 1990*.

in Guangdong employed 2.453 million people and another 3.348 million people were self-employed[19]. In total, private sector accounted for 14.64% of total labor force.

Given Guangdong's favorable geographic factors, strategic location, well-developed infrastructure, booming township and village enterprises and well-trained labor force, it can be expected to keep on its growing momentum.

6.2 Top winner no. 2: Zhejiang province

Zhejiang province[20] is located in the southern wing of the Yangtze River Delta on the Southeast Coastal China. It has a total continental area of 101,800 square kilometers, which accounts for 1.06% of the national total. Zhejiang has varied topography: hills and mountains account for 70.4% of its total area, plains and basins make up 23.2% and the rest is water area. There are 8 rivers in the region and its coastline reaches 6,486 km.

Zhejiang is situated in a subtropical zone of monsoon climate, blessed with abundant sunshine and ample rainfall. With 20% of its land arable, Zhejiang is a comprehensive agricultural area and its agricultural outputs are high. It has long been regarded as "land of fish and rice", "capital of silk and tea", "place of rich cultural relics" and "paradise for tourists". Forestry covers 59.4% of its total area and it is the most densely forested region in China. It is also rich in non-metallic reserves. Thanks to its rich natural endowments, Zhejiang was traditionally one of the richest regions in China.

By the end of 2001, Zhejiang had a total population of 46.13 million and its population density was more than 453 persons per square kilometers[21]. In 1982, urban population accounted for 25.48% of Zhejiang's total population, and in 2000, the share of urban population rose to 48.69%[22]. Minority nationalities people accounted for 0.85% of total population in Zhejiang in 2000.

In Zhejiang, labor participation rate is high (see Table 11) and its net investment rate (the ratio of investment in fixed assets net of depreciation to regional GDP) was high throughout the 1986-2001 period. State sector plays a relatively less important role in Zhejiang. On the contrary, private sector is an important driving force for Zhejiang's economic development. In 1989, there

[19] Data are from *China Statistical Yearbook 2002*.

[20] Facts and data about Zhejiang province comes from the official web site of Zhejiang government, www.zhejiang.gov.cn.

[21] Population data is from *China Statistical Yearbook 2002*. Population density is calculated by dividing population by total areas.

[22] Urban population shares are calculated based on raw data from various *China Statistical Yearbooks*.

were 36,006 township enterprises and 54,249 village enterprises in Zhejiang[23]. In 2001, private firms employed 3.471 million people and another 2.773 million people were self-employed. In total, private sector accounted for about 22.53% of total employment in Zhejiang[24].

Geographically speaking, Zhejiang is close to Taiwan, Japan and Korea and before 1992 it had 2 open coastal cities. It is not as popular as Guangdong as destination for foreign investment, however, it managed to attract more and more foreign capitals (see Table 11). Its real per capita foreign investment rose from 0.59 USD (1981 price) during the 1986-1989 period to 8.07 USD during the 1998-2001 period. Its share of total foreign investment in the country increased from 1.60% during the 1986-1989 period to 3.56% during the 1998-2001 period.

As for the industrial structure in Zhejiang (see Table 12), the trend is the same as in Guangdong: primary sector is becoming less important while tertiary sector is expanding quickly. The output shares of primary sector, secondary sector and tertiary sector in 1985 were 33.3%, 52.9% and 13.8% while they became 10.3%, 51.3% and 38.4% in 2001 respectively.

As for the employment structure in Zhejiang (see Table 13), the three sectors got rather similar shares in 2001: 35.7% for primary sector, 32.2% for secondary sector and 32.1% in tertiary sector. By comparison, the corresponding shares in 1985 were 55.4%, 28.2% and 16.4%. Roughly speaking, in terms of employment shares and output shares, Zhejiang's primary and secondary sectors seem to be more efficient than their counterparts in Guangdong.

Given Zhejiang's favorable geographic factors and natural endowments, continuously high net investment rate and booming private sector, Zhejiang can be expected to grow even faster over the medium-term.

6.3 Top loser no. 1: Guizhou province

Guizhou province[25] is situated in the southwest corner of China and it covers an area of 176,100 square kilometers. It lies more than 1,000 meters above sea level.

The climate of Guizhou is temperate and it enjoys ample precipitation. Guizhou is rich in hydropower resources and mineral reserves such as coal, phosphorus, aluminum, manganese, gold, etc. It has been known as "home of coal in South China".

[23]Data are from *China's Statistical Yearbook 1990*.
[24]Data are from *China Statistical Yearbook 2002*.
[25]Facts and data about Guizhou come from the web site www.china.org.cn.

Guizhou's main industries include raw material processing industry, machinery and electronics industry, light and textile industry. In particular, its cigarette-making and brewery industries play a significant role nationwide. Guizhou has also become a new hot spot for tourists.

The total population in Guizhou in 2001 was 37.99 million and its population density was over 215 persons per square kilometer[26]. In 1985, urban population made up 18.85% of Guizhou's total population. In 2000, the share of urban population increased to 23.86%[27]. Minority nationalities people accounted for 37.85% of Guizhou's total population[28]

The state has made lots of investment in Guizhou to construct new railway lines. Once those construction projects are completed, Guizhou will serve as a major transportation pivot in Southwest China.

Due to its unfavorable geographic factors, Guizhou has not been able to attract much foreign investment (see Table 11). During the 1998-2001 period, the real per capita foreign investment in Guizhou was 0.24 USD (1981 price). Its share of total foreign investment in the country actually decreased from 0.35% during the 1986-1989 period to 0.08% during the 1998-2001 period.

As can be seen in Table 11, the labor participation rate in Guizhou has been increasing steadily. During the 1986-1997 period, its net investment rate was relatively low, however, during the 1998-2001 period, it increased substantially, to almost 24%.

As for the industrial structure in Guizhou, the importance of primary and secondary sectors are decreasing while tertiary sector is expanding (see Table 12). In 1985, the output shares of primary, secondary and tertiary sectors were 46.2%, 41.9% and 11.9% respectively. In 2001, the corresponding figures were 25.3%, 38.7% and 36.0%.

In terms of employment, primary sector still plays the most important role (see Table 13). The employment shares of primary, secondary and tertiary sectors in 1985 were 79.3%, 10.3% and 10.5%. In 2001, the corresponding figures were 66.4%, 9.4% and 24.2%. The primary sector in Guizhou tend to be very inefficient. In 2001, it employed 66.4% of Guizhou's total labor force while it accounted for only 25.3% of total output in Guizhou. In Guizhou, the private

[26]Guizhou's 2001 population data comes from *China Statistical Yearbook 2002*. Population density is calculated by dividing Guizhou's population by its total area.

[27]Shares of urban population are calculated based on raw data from various *China Statistical Yearbooks*.

[28]Share of minority nationalities people came from *China Statistical Yearbook 2001*.

sector is very small. In 2001, private sector accounted for about 4.17% of total employment, with 0.283 million people employed by private firms and another 0.579 million people self-employed[29].

Given its unfavorable geographic factors and multi-linguistic population, lots of investment still have to be made in Guizhou to improve infrastructure and the average quality of its labor force in terms of education. Furthermore, more favorable policies should be designed to encourage the development of private sector.

6.4 Top loser no. 2: Gansu province

Gansu province[30] is situated in West China, at the upper reach of Yellow River and its land area amounts to 455,000 square kilometers including 3.53 million hectares of cultivated land, 16.64 million hectares of grassland, 6.66 million hectares of wasteland and 4.76 million hectares of mountain slopes. It lies 1,000-2,000 kilometers above sea level. Yellow River and many of its branches run through the region.

There is a variety of climate in Gansu, ranging from subtropical to extremely cold. The temperature difference between day and night is big. Gansu faces an adverse ecological environment: an acute shortage of water resources and serious loss of water and soil. There are also various climate catastrophes in this region: draught, sand storm, storm, etc. On average, there are 3-69 extremely windy days and 1-37 sand storm days each year.

Gansu is rich in mineral resources such as nickel, zinc, cobalt, platinum, copper, etc. It is located in the upper reach of Yellow River, hence, it also has great hydropower potential. Gansu's main industries include non-ferrous metals industry, hydropower industry, petrochemical industry, machinery industry and construction materials industry. It is also rich with resources for tourism.

By the end of year 2001, Gansu had a total population of 25.75 million and its population density was only about 57 persons per square kilometer[31]. In 1985, urban population accounted for 15.85% of Gansu's total population. And in 2001, the share of urban population rose to 24.00%[32]. Minority nationalities people made up 8.69% of Gansu's population in 2000[33].

[29] Data come from *China Statistical Yearbook 2002*.

[30] Facts and data about Gansu comes from the official web site of Gansu government, www.gansu.gov.cn.

[31] 2001 population data comes from *China Statistical Yearbook 2002* and population density is calculated by dividing Gansu's population by its total area.

[32] Shares are calculated based on raw data from various *China Statistical Yearbooks*.

[33] Data comes from *China Statistical Yearbook 2001*.

Table 11: A brief comparison of winner and losers

	Guangdong	Zhejiang	Guizhou	Gansu
Real per capita foreign investment (USD, 1981 price)				
1986-1989	10.13	0.59	0.19	0.04
1990-1993	23.12	3.26	0.31	0.09
1994-1997	40.75	7.83	0.42	0.85
1998-2001	40.36	8.07	0.24	0.55
Share of total foreign investment in China (%)				
1986-1989	43.86	1.60	0.35	0.05
1990-1993	41.23	2.37	0.24	0.05
1994-1997	30.09	3.43	0.13	0.18
1998-2001	30.53	3.56	0.08	0.12
Labor participation rate (%)				
1986-1989	50.54	59.12	47.57	50.54
1990-1993	51.24	61.76	51.40	51.24
1994-1997	52.73	62.21	53.22	52.73
1998-2001	49.23	59.20	54.88	49.23
Investment rate				
1986-1989	0.1320	0.1558	0.1396	0.1629
1990-1993	0.1734	0.1583	0.1025	0.1303
1994-1997	0.1578	0.1668	0.0916	0.0968
1998-2001	0.1628	0.2474	0.2397	0.2157
Primary industry				
1986-1989	0.5546	0.5261	0.7744	0.6375
1990-1993	0.4922	0.5103	0.7801	0.6364
1994-1997	0.4132	0.4249	0.7322	0.5816
1998-2001	0.4243	0.3899	0.6929	0.5923
State sector				
1986-1989	0.1683	0.1083	0.1197	0.1857
1990-1993	0.1729	0.1130	0.1046	0.1853
1994-1997	0.1593	0.1076	0.1039	0.1788
1998-2001	0.1192	0.0773	0.0779	0.1416

Source: Author's own calculation based on raw data from *China Statistical Yearbook 1986-2002* published by China's State Statistics Bureau.

Table 12: Changes in production structure (%) by region

Region	1985, production structure			2001, production structure		
	1st sector	2nd sector	3rd sector	1st sector	2nd sector	3rd sector
Coastal						
Beijing	8.9	74.0	17.1	3.3	36.2	60.5
Tianjin	8.2	71.4	20.4	4.3	49.2	46.6
Hebei	34.5	53.2	12.3	16.4	49.6	34.0
Liaoning	16.6	72.1	11.3	10.8	48.5	40.7
Shanghai	4.5	76.5	19.0	1.7	47.6	50.7
Jiangsu	32.6	57.8	9.6	11.4	51.6	37.0
Zhejiang	33.3	52.9	13.8	10.3	51.3	38.4
Fujian	40.9	44.4	14.7	15.3	44.8	39.9
Shandong	41.8	49.2	9.0	14.4	49.3	36.3
Guangdong	37.9	43.5	18.6	10.8	48.7	40.5
Guangxi	49.1	35.7	15.2	25.2	35.5	39.3
Central						
Shanxi	24.8	62.0	13.2	9.6	51.6	38.8
Inner Mongolia	43.9	42.1	14.0	23.2	40.5	36.3
Jilin	32.9	55.8	11.3	20.1	43.3	36.5
Heilongjiang	26.5	63.4	10.1	11.5	56.1	32.4
Anhui	50.3	39.7	10.0	22.8	43.0	34.2
Jiangxi	47.6	41.0	11.4	23.3	36.2	40.5
Henan	45.3	42.0	12.7	21.9	47.1	31.0
Hubei	39.5	48.0	12.5	14.8	49.6	35.5
Hunan	48.4	39.6	12.0	20.7	39.5	39.8
West						
Sichuan	44.9	43.0	12.1	20.7	40.3	39.1
Guizhou	46.2	41.9	11.9	25.3	38.7	36.0
Yunnan	47.0	39.7	13.3	21.7	42.5	35.8
Tibet	69.9	22.9	7.2	27.0	23.2	49.8
Shaanxi	35.2	52.2	12.6	15.6	44.3	40.2
Gansu	29.6	51.8	18.6	19.3	44.9	35.8
Qinghai	33.9	49.6	16.5	14.2	43.9	41.9
Ningxia	37.1	49.4	13.5	16.6	45.0	38.4
Xinjiang	44.9	40.6	14.5	19.4	42.4	38.2

Note: The 2001 data for Hainan and Chongqing are incorporated into those for Guangdong and Sichuan respectively. 1st sector: primary sector, 2nd sector: secondary sector, 3rd sector: tertiary sector.

Table 13: Changes in employment structure (%) by region

Region	1985, employment structure			2001, employment structure		
	1st sector	2nd sector	3rd sector	1st sector	2nd sector	3rd sector
Coastal						
Beijing	16.9	44.3	38.9	11.2	33.5	55.3
Tianjin	21.6	50.5	27.9	20.0	39.3	40.7
Hebei	63.2	21.6	15.2	49.6	25.4	25.0
Liaoning	35.9	40.5	23.6	37.2	25.2	37.6
Shanghai	16.8	55.4	27.8	12.5	41.7	45.8
Jiangsu	51.4	31.5	17.1	41.4	30.1	28.5
Zhejiang	55.4	28.2	16.4	35.7	32.2	32.1
Fujian	61.6	19.5	18.9	45.8	25.1	29.1
Shandong	65.5	19.5	15.1	52.3	23.9	23.8
Guangdong	60.3	19.9	19.8	41.6	25.9	32.5
Guangxi	80.1	8.9	11.1	61.8	10.1	28.1
Central						
Shanxi	48.3	29.2	22.5	46.9	24.5	28.6
Inner Mongolia	59.1	21.1	19.8	53.9	16.0	30.1
Jilin	46.0	31.1	22.8	50.7	18.6	30.7
Heilongjiang	41.5	35.1	23.4	49.6	20.8	29.6
Anhui	71.8	15.1	13.2	58.7	16.3	25.0
Jiangxi	66.1	17.9	16.0	51.6	14.3	34.1
Henan	72.5	14.6	12.9	63.1	18.1	18.8
Hubei	60.4	21.4	18.2	48.4	18.1	33.5
Hunan	74.1	13.7	12.3	60.5	14.4	25.1
West						
Sichuan	74.8	13.8	11.5	57.7	14.8	27.5
Guizhou	79.3	10.3	10.5	66.4	9.4	24.2
Yunnan	77.9	10.4	11.7	73.6	9.0	17.4
Tibet	80.9	4.9	14.2	71.8	6.5	21.7
Shaanxi	64.2	20.6	15.2	55.7	16.7	27.6
Gansu	62.8	15.0	22.2	59.4	13.4	27.2
Qinghai	60.6	21.6	17.8	60.0	13.0	27.0
Ningxia	65.2	18.7	16.1	56.5	18.2	25.3
Xinjiang	63.8	17.1	19.1	56.6	13.4	30.0

Note: The data for Hainan and Chongqing in 2001 are incorporated into those for Guangdong and Sichuan respectively.

Gansu's labor participation rate (see Table 11) declined from 52.73% during the 1994-1997 period to 49.23% during the 1998-2001 period. Its net investment rate was as low as 9.68% during the 1994-1997 period, however, it rose to 21.57% during the 1998-2001 period. The state sector is an important source for employment.

Gansu is also not a hot spot for FDI (see Table 11). Foreign investment goes into Gansu is more likely in the form of foreign aids. During the 1994-2001 period, Gansu attracted slightly more foreign investment than Guizhou in terms of real per capita foreign investment. Its real per capita foreign investment during the 1994-1997 period was 0.85 USD (1981 price) and during the 1998-2001 period, it dropped to 0.55 USD. Gansu's share of total foreign investment rose from 0.05% during the 1986-1989 period to 0.12% during the 1998-2001 period.

As for industrial structure in Gansu (see Table 12), the output shares of primary, secondary and tertiary sectors in 1985 were 29.6%, 51.8% and 18.6% respectively. And in 2001, they were 19.3%, 44.9% and 35.8%.

The changes in Gansu's employment structure are rather insignificant (see Table 13). In 1985, the employment shares of primary, secondary and tertiary sectors were 62.8%, 15.0% and 22.2% respectively. In 2001, they became 59.4%, 13.4% and 27.2%. The secondary sector in Gansu seems to be rather efficient. It employed 13.4% of Gansu's labor force and accounted for 44.9% of its total output. Gansu's private sector is slightly larger than Guizhou's. In 2001, private firms employed 0.267 million people and additional 0.547 million people were self-employed[34]. In total, private sector accounted for close to 6.86% of total employment.

Given Gansu's unfavorable geographic factors and adverse ecological environment, Gansu should keep on making large amounts of investment in infrastructure and education. Meanwhile, more efforts should be made to improve Gansu's ecological environment. If the quality of its land keeps on deteriorating and the ecological environment worsens, Gansu's economy will tend to grow slower in the medium- and long-run and it will lag even further behind its counterparts.

6.5 Summary

Given the development experiences of Guangdong, Zhejiang, Guizhou and Gansu, geographic factors, natural endowments, healthy private sector, proper industrial structure and efficiency all play important roles in a region's economic development. In general, this confirms the regression results obtained

[34]Data come from *China Statistical Yearbook 2002*.

in the previous 2 sections.

Some of the determinants of economic growth are inimitable, for instance, favorable geographic factors (such as geographic location, topography, favorable climate, amount of arable land and so on) and natural endowments (water resources, mineral resources, coastlines, etc.). But others can be developed through investment and favorable policies, for example, infrastructure, entrepreneurship, healthy private sector and efficiency.

Poor regions can learn from rich regions' development experiences, based on their own conditions, to try to catch up. Rich regions can also learn from more developed regions and countries to grow even faster. What should governments at various levels do to enhance the learning and catching-up process? This will be examined in the next section.

7 Policy implication

The performance of China's economy has been quite impressive since 1978. However, China is not alone. Hong Kong, Taiwan, Singapore and South Korea had been experiencing rapid and sustained growth of per capita output, averaging 6% to 7% for about 25 years[35]. This "catching-up" phenomenon can be explained by neo-classical growth theories: poor economies tend to grow fast at the early stage of their development when diminishing return to capital has not set in yet.

When China adopted the reform and open-up policies, its economy was extraordinary small, which was the result of the Great Leap Forward (1958-1962) and the Cultural Revolution (1966 - 1976). Given China's huge reserves of labor force, with favorable policies and sufficient investment in physical capital and human capital, many regional economies in China take off during the reform period. However, in the process of going after rapid economic growth, quite some critical issues have emerged, for instance, environmental pollution, inequalities, wide-spread corruption, etc. All these issues have to be dealt with properly and in terms of sustainable economic development, there is surely much for China to learn from other Asian NICs[36] (Newly Industrializing Countries) and advanced Western countries.

[35] Young, 1994.

[36] The first group of countries identified as NICs include Hong Kong, South Korea, Singapore and Taiwan. Recently, China and Malaysia have joined this club.

Table 14: Changes in education, urban & working-age population (%), etc.

Region	Education		Urban pop		15-64 pop		(1)	(2)
	1982	2000	1982	2000	1982	2000		
Coastal								
Beijing	6.27	9.07	64.85	77.54	71.97	78.04	51.48	55.35
Tianjin	5.61	8.08	68.38	71.99	70.24	74.93	55.55	50.55
Hebei	4.24	6.83	13.82	26.08	63.54	70.32	7.58	50.47
Liaoning	5.16	7.47	42.01	54.24	66.48	74.49	24.81	47.47
Shanghai	6.24	8.40	58.93	88.31	74.41	76.28	58.89	54.52
Jiangsu	4.10	6.95	15.67	41.49	65.47	71.59	25.93	53.16
Zhejiang	4.02	6.57	25.48	48.67	64.94	73.09	24.70	60.37
Fujian	3.54	6.60	21.04	41.57	59.12	70.44	39.24	46.91
Shandong	3.81	6.71	19.16	38.00	63.34	71.12	18.31	50.93
Guangdong	4.32	7.12	18.49	53.76	60.66	69.46	114.47	50.81
Guangxi	3.97	6.65	12.24	28.15	57.44	66.64	9.32	51.17
Central								
Shanxi	4.58	7.10	21.24	34.91	61.64	68.00	10.01	46.05
Inner Mongolia	4.08	6.88	29.12	42.68	60.87	73.37	8.11	43.52
Jilin	4.77	7.31	39.59	49.68	62.85	75.19	13.56	45.04
Heilongjiang	4.68	7.31	39.90	51.54	61.69	75.68	12.10	41.59
Anhui	3.12	6.13	14.37	27.81	59.77	67.03	7.00	51.61
Jiangxi	3.65	6.64	19.21	27.67	56.70	67.90	6.37	47.68
Henan	3.83	6.81	13.63	23.20	59.87	67.10	4.48	51.20
Hubei	4.19	6.87	17.68	40.22	62.28	70.82	6.85	45.64
Hunan	4.31	6.87	15.00	29.75	61.09	70.54	5.24	52.71
West								
Sichuan	3.81	6.23	14.13	28.43	60.94	69.97	5.50	53.92
Guizhou	2.74	5.35	18.85	23.87	54.46	63.92	5.17	51.37
Yunnan	2.63	5.52	12.52	23.36	56.33	67.98	7.42	53.26
Tibet	1.33	2.97	12.70	18.93	58.79	64.30		46.28
Shaanxi	4.17	6.82	18.87	32.36	62.37	69.06	9.59	49.20
Gansu	3.13	5.75	15.85	24.01	60.19	68.00	5.34	47.20
Qinghai	3.08	5.40	20.36	34.76	56.75	69.05	5.44	46.42
Ningxia	3.19	6.21	22.39	32.43	55.54	67.15	9.42	46.51
Xinjiang	3.89	6.83	28.50	33.82	56.76	68.17	9.85	39.55

Source: Author's own calculation based on raw data from various *China Statistical Yearbooks* published by China's State Statistics Bureau.

Note: China's education system was changed during the mid-1980s, with 6 years of primary schooling instead of 5. But for sake of consistency and due

to lack of information, the assumption that primary education covers 5 years is maintained in the calculation of average years of schooling for 1982 and 2000.

The data for Hainan and Chongqing are incorporated into those for Guangdong and Sichuan respectively.

Column (1) is average international openness rate (a region's sum of exports and imports divided by its GDP) during the 1992-2001 period. Tibet's data is missing.

Column (2) is average participation rate (number of people employed in a region divided by its total regional population) during the 1985-2001 period.

7.1 Where is China on the way to industrialization?

To some extend, China is now repeating the growing experiences of Japan and Asia's NICs (Hong Kong, South Korea, Singapore and Taiwan) after the Second World War. In 1960s, Japan's real GDP had been growing at an annual rate of 8.9%, per capita output growing at 7.7% annually[37]. NICs experienced rapid industrial growth in the 1970s and 1980s, attracting significant foreign investment, and are now associated with high-tech industries. During the 1966-1990 period, Singapore's economy grew at an annual rate of 8.5% (3 times as fast as the US), and its per capita income grew at 6.6% per annum[38].

Some economists contributed the rapid growth of the four "tiger economies" to their outward orientation and improvements in productivity. However, a few other economists emphasized the importance of factor accumulation in those economies. Krugman (1994) argues "The newly industrializing countries of Asia, like the Soviet Union of the 1950s, have achieved rapid growth in large part through an astonishing mobilization of resources." He believes that only Japan's growth in the 1950s and 1960s seemed to stem from both high growth rates of inputs and high growth rates of efficiency. Young (1994) also thinks that factor accumulation accounts for the rapid and sustained growth of the four "tiger economies", namely, a substantial rise in the aggregate participation rate caused by rapid post-war decline in birth rates and rising participation rates of female labor force, inter-sectoral transfer of labor, human capital accumulation and increasingly high investment rates (except Hong Kong, its investment rates were rather constant.). For example, in Singapore, participation rate surged from 27% to 51%, the educational levels of its labor force were dramatically upgraded and its investment rate was high, rising from 11% to over 40%[39]. During the 1960-1980 period, the investment rate doubled in Taiwan, tripled in South Korea and almost quadrupled in Singapore[40].

As for China, factor accumulation is also the key to understand China's rapid growth. There is no dramatic change in labor participation rate (see Table 14) as the participation rate of female labor force in China was already high during the pre-reform period. However, the inter-sectoral transfer of labor is quite substantial. As as be observed from Figure 5 ("Points" stand for regions in Coastal China, "crosses" represent regions located in Central China and "stars" stand for regions in West China.) and Table 13, large amount of workers have shifted into tertiary sector. Employment shares of tertiary sector in all regions in China have been rising. Tertiary sectors in the three municipal cities in Coastal China - Beijing, Tianjin and Shanghai - have the highest employment shares. There three cities are also the most urbanized Chinese

[37] Krugman, 1994.
[38] Ibid.
[39] Ibid.
[40] Young, 1993

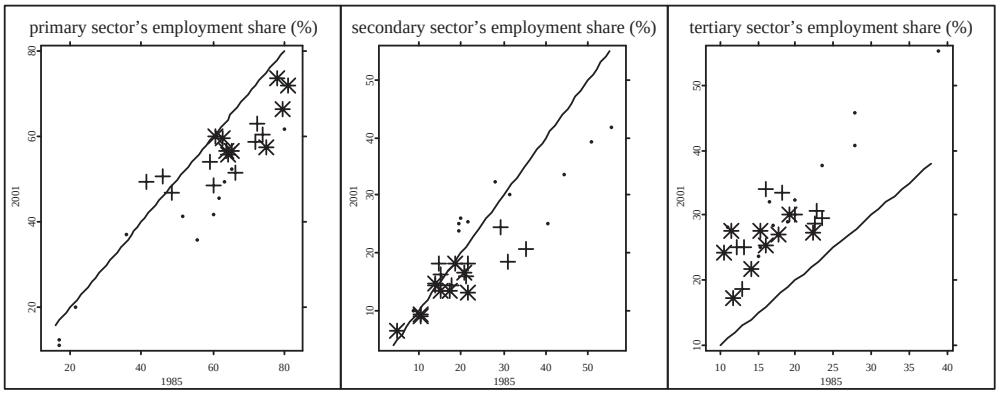

Figure 5: Employment structure changes

cities (see Table 14). Correspondingly, in most regions, the employment shares of primary sector have been decreasing. However, primary sector is still the biggest employer in China except in Beijing, Tianjin and Shanghai, especially in Central and West China. As for secondary sector, the picture is mixed. In Coastal China, the employment shares of secondary sector tend to be relatively high while those in West China tend to be low.

The story with industrial structure change in China's regions is similar. As can be seen from Figure 6 and Table 12, the output shares of primary sector have been decreasing in all regions while those of tertiary sector have been increasing. The output shares of primary sector in coastal regions tend to lower than in Central and West China. As for secondary sector, the picture is mixed. As China pursued a heavy industry-oriented development strategy during the pre-reform period, secondary sector tend to be playing the most important role in the economies of most regions. Furthermore, under the cental government's "self-sufficiency" guideline during the pre-reform era, each region had similar sets of industries, the result of heavy investment by central and local governments, not based on comparative advantages of each regions. Since 1978, the state has removed the restrictions imposed on commerce and service industries and encouraged development of private sector. As a result, labor-intensive tertiary sector has been developing rapidly. In contrast, in many regions, the output shares of capital-intensive secondary sector have been declining. However, in most regions in China, secondary sector still tends to be the most important sector in the regional economies.

The Chinese government has been paying lots of attention to education. As can be seen from Figure 7 and Table 14, educational attainment in terms of average years of schooling has been improved all over China. However, due to high tuition fees and living expenses, many poor rural households can't af-

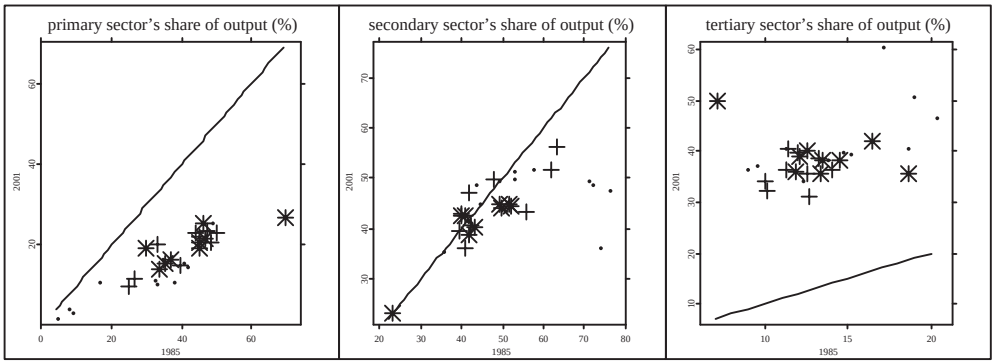

Figure 6: Industrial structure changes

ford a proper education for their children. Despite the state's policy of 9-year compulsive education, many children in the rural areas fail to finish junior secondary schools, let alone higher education. Rich regions in Coastal China still tend to have the best-educated population.

As for urbanization, the shares of urban population in all Chinese regions have been increasing (see Table 14). In particular, the process of urbanization in coastal regions is rather rapid while regions located in West China tend to have smallest urban populations.

7.2 Problems China is facing

One of the goals of China's leadership is to "turn China into a well-to-do society" and accordingly, the Chinese governments at various levels has implemented many favorable policies to help the Chinese people to get rich. Large amount of Chinese do benefit from those policies and get better off. Unfortunately, the gaps between the rich and the poor are getting wider and wider and China becomes one of the most unequal societies in the world. What's worse, many people get rich through illegal or doubtable means and corruption becomes a wide-spread phenomenon in China. This leads to mis-allocation and waste of resources, distortion of markets and inefficiency.

The central government has been making great efforts to solve this problem, for instance, making the operation of government bodies and agents more transparent, implementing more rigorous anti-corruption laws and regulations, etc. Unfortunately, those measures fail to solve the corruption problem from the root. After fiscal deregulation, local governments have the authorities to regulate their local economies. Furthermore, since the Chinese economy is still

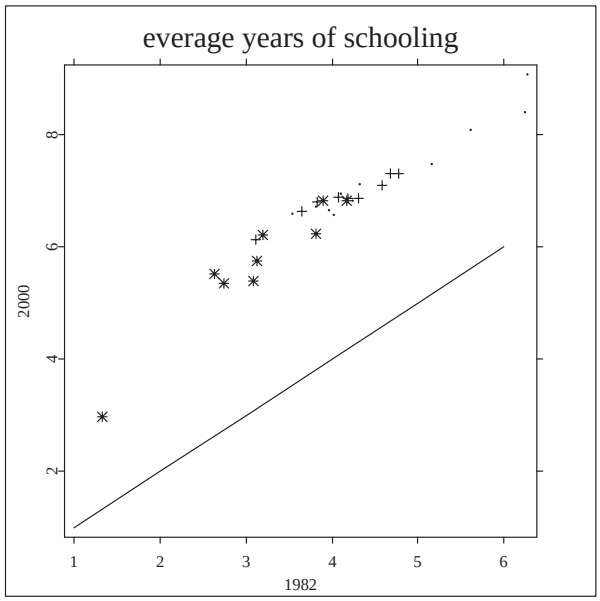

Figure 7: Changes in average educational attainment

a mixture of planned and market economies, various government bodies and agencies have the control over import and export quotas, license, budgets, etc. In other words, government bodies and agencies are still in control of the society and they are extremely powerful. On the other hand, there are not many checks over their power and civil servants in China are usually badly paid, compared with their counterparts in other more advanced societies. Therefore, government employees in China have all the incentives and means to be corrupt without appropriate checks on their misbehavior.

Traditionally China has been a society ruled by people, not ruled by law. Relationship ("Guanxi" in Chinese), not rules and regulations, plays the most important role in the society. China still has much to do in the field of law-making and law-implementation in order to turn itself into a "rule of law" society.

Just like the legal institutions in China, financial institutions are also underdeveloped. The 4 big state-owned banks play the key role in China's financial field. However, all of them are loaded with bad debts that come from policy lending to SOEs. The 4 state-owned banks have thousands of branches all over China. Roughly speaking, they are the only destinations in China for resident deposits. While flushed with cash, they are unwilling to grant loans to private sector (Recently, housing loans to house-buyers become a hot spot for banks.) that fails to draw much attention from local authorities, instead they are actively engaged in financing not-well-operated SOEs because branch

employees' performance is evaluated by local government officials who are in charge of those SOEs. China do have 2 stock exchanges. Unfortunately, the players in this market are usually not regulated and now and then, the 2 stock exchanges are subject to manipulation. For sustained rapid growth of China's economy, China must develop a well-functioning financial system. To allow foreign competitors into this market might accelerate the process.

According to neo-classical growth theories, the key force for convergence is factor mobility. However, in China, this force is not working properly. Rural residents used to be tied to their land. The state is loosing restrictions on movement of rural labor force and Chinese working force can be expected to be more mobile. But due to limits on accommodation capacities of cities, the process of labor mobility will tend to be small-scaled. As for mobility of physical capital, the prospect is even dimmer. During the reform era, especially after fiscal decentralization, the regional markets in China are not on the way to be integrated, instead, they become more fragmented and the force of regional protectionism is very strong[41]. If the fragmented regional markets in China can be integrated, the Chinese economy could be growing even faster.

Another serious problem China is facing is environmental pollution and degrading of ecological environments. At the early stage of reform, environmental protection was an unheard-of concept in China and state-owned and private factories released large amount of waste and even poisonous water into lakes and rivers, as a result, many water bodies in China are greatly polluted. "White trash" (plastic products such as plastic bags, plastic boxes for fast food, plastic cups, plastic packages, etc.) creates another headache.

Economic development goes hand in hand with increasing energy consumption. During 1980s and early 1990s, huge amount of cheap coals were burned throughout China, both at factories and at households. Buses and cars in China consumed unclean fuels. As a result, the air in many Chinese cities was seriously polluted and acid rains rained quite often. This started to draw attention at national level and in late 1990s, State Administration of Environmental Protection was set up. However, China is facing a dilemma: The problem of energy shortage is already acute. If it turns to clean energy, it faces bottle necks immediately and its economy will stagnate.

In addition to energy shortage and environmental pollution, China gets hit by various disasters caused by deteriorating ecological environments: draught in the North, flood in the South, desertization, sand storm, etc. The root of degrading of ecological environments in China actually lies in the Great Leap Forward. Rapid expansion of population and fast urbanization further make

[41] Young (2000) makes detailed discussion on this issue. Brun, Combes and Renard (2002) and Li, Qiu and Sun (2003) all support this opinion.

the problem worsen. The state is making efforts to counter the degrading process, for instance, tree-planting program, gradually returning cultivated land into forest and grassland at the upper reach of Yellow River and Yangtze River, etc. However, ecological environment is usually easy to destroy but difficult to restore. It takes long time to see the results.

7.3 Policy suggestions

Like the other NICs, China should make good use of its advantage of being backward by adopting most advanced technologies used in developed countries without devoting resources to develop those technologies[42]. According to Timmer (1998), "catch up by using unexploited technologies requires investment, not only in physical capital, but also in human capital as upgraded skills are required to operate the new capital goods and to use them efficiently." He further believes that the potential for an economy to catch up is not only determined by the degree of backwardness in the economy, but also by its social capacities that can be partially identified with its political, legal, industrial and financial institutions.

To some extent, China is also using its advantage of being backward in many fields to import advanced technologies and management skills. However, as mentioned in the previous section, China's social capacities in terms of legal, industrial and financial institutions are not well developed yet to accelerate its catching up process. Corruption, regional protectionism and environmental problems not only delay China's catching up process, but also influence social welfare negatively. To solve these problems, China should accelerate the transition process and make its economy more market-oriented, or the best thing is to turn its economy into a real market economy. In this way, without import and export quotas and licenses, policy lending, etc., government bodies and agencies will become less powerful and government officials have less means to be corrupt.

Of course, another way to eliminate corruption is to learn from Singapore: pay high salaries to government officials and implement vigorous laws and regulations. However, due to the huge size of China's government bodies and agencies, the state doesn't have the budget to pay its employees better. As for the second measure, China does need to improve its legal institutions: to enhance law-making process, to train more qualified lawyers and judges, to improve law-implementation, etc. Together with well-developed legal institutions and market mechanisms, China could develop a properly functioning financial system, which in turn could further enhance China's economic development.

[42]Timmer (1998) believes that Taiwan underwent a process of swift industrialization after 1948 by adopting this approach.

With governments at various levels less powerful and playing a smaller role in local economies, the force of regional protectionism could be weakened and the markets all over China could become more integrated. But as for environmental protection, government bodies and agencies still have to be in control since markets for such public goods as clean air and water practically do not exist. The state should also implement favorable policies to encourage development of clean and sustainable energy such as wind energy, solar power, hydropower and so on.

As for the problem of inequalities, the best solution should be to help poor regions to catch up with rich regions. The state should allocate more resources to improve the infrastructure and educational attainment of the mass in poor regions and help cultivate entrepreneurship through low-interest loans, subsidies and other preferential treatment to private sector. The poor regions' catching up process will be closely related with the development of China's social capacities.

8 Conclusion

The aim of this study is to analyze the determinants of regional economic growth in China. The paper confirms that urban-rural disparities in China are getting worse but real per capita income both in rural areas and in urban areas is converging. Through cross-sectional analysis and panel data regression, it is found that geographic factors, development of private sector, diffusion of advanced technologies through foreign investment, in particular, FDI, and improved qualities of human resources are all key factors for rapid development of regional economies.

The paper also examines the various problems (such as environmental pollution, corruption, regional protectionism and so on) that are hampering China's further development and that have negative effects on social welfare in China. It is suggested that in order to close the gap between the rich and the poor, China should accelerate its transition process to a real market economy and improve its legal, financial and industrial institutions. China should depend more on market mechanism rather than on government regulation and intervention to achieve efficiency of resource allocation. When the state accomplishes those goals, the catching up process in China's various regions can be expected to be even more fascinating.

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10 Appendix

List of SEZs and open coastal cities before 1992

	Year of approval	Location
SEZs		
Shantou	1979	Guangdong
Xiamen	1980	Fujian
Shenzhen	1979	Guangdong
Zhuhai	1979	Guangdong
Coastal open cities		
Tianjin	1984	Tianjin
Qinghuangdong	1984	Hebei
Dalian	1984	Liaoning
Shanghai	1984	Shanghai
Lianyuangang	1984	Jiangsu
Nantong	1984	Jiangsu
Ningbo	1984	Zhejiang
Wenzhou	1984	Zhejiang
Fuzhou	1984	Fujian
Yantai	1984	Shandong
Qingdao	1984	Shangdong
Guangzhou	1984	Guangdong
Zhanjiang	1984	Guangdong
Beihai	1984	Guangxi

Source: Démurger, Sachs, Woo, Bao and Chang, 2002.

Note: SEZ stands for Special Economic Zone.

Declaration of Authorship

I hereby confirm that I have written this master thesis independently and use no other than the indicated resources. All contents which are literally or in general matter taken out of publications or other resources are marked as such.

Zhou Qiong
Berlin, May 25, 2004