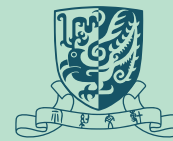


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Regional Polarization in Guangdong Province in South China

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Regional Polarization in Guangdong Province in South China

1. Introduction

China has experienced rapid economic growth since 1978, and Guangdong has been at the forefront of the economic reform and open-door policy due to its close location to capitalist Hong Kong and Macau and to its close links with overseas Chinese. In two decades, Guangdong has risen rapidly and become the major economic centre in south China. It had the largest gross domestic product (GDP) output of 732 billion *yuan* among 31 provincial units in mainland China in 1997 (SSB, 1998). Its GDP per capita of 10,428 *yuan*, almost double the national average, ranked fifth in the mainland in 1997, just after the three municipalities of Shanghai, Beijing and Tianjin and the coastal province of Zhejiang. Guangdong's size is like a medium-sized country elsewhere in the world and is much greater than Shanghai, Beijing and Tianjin, with an area of 177,901 square kilometres and a population of 71 million in 1997.

The transition towards a market economy in Guangdong, as elsewhere in China, after 1978 has reshaped the focus and emphases of regional development. The development within Guangdong has not been evenly spread spatially; the Zhujiang Delta within the province has developed the fastest in the past two decades. However, most studies in the literature on Chinese unbalanced regional development have focused on the provincial level and little has been done about regional/local variation, especially at the county level, within a province such as Guangdong (Chan et al., 1996; Fan, 1995a, 1995b, 1997; Pannell, 1988; Wei,

1996, 1998; Wei and Ma, 1996; Wu, 1987; Yeung et al., 1999; Ying, 1999; Zhao, 1996). Indeed, an explicit regional development policy has only existed at the national level. Regional development within a province is driven by the general economic reform, the emerging market economic system and the unique set of local factors, responses and initiatives. It is hard to predict what are the consequences of this new regime of socialist-market economy on the convergence or divergence in regional development within a province. In this paper, Guangdong as a leading province in China's transition to a market economy is chosen as a case study to examine the resulting spatial patterns and processes of development among its counties under the new regime from 1980 to 1995.

A few studies have examined Guangdong's regional inequality and changing spatial structure in the post-reform period. Xu and Li (1995) and Leung (1996) examined the distribution and locational considerations of foreign direct investment (FDI) in the province, to discover significant geographical variations in distribution. Ouyang (1993), using GDP per capita for various counties in the period of 1980-1990, found that the regional disparity had increased since the introduction of economic reform and open-door policy, especially between the Zhujiang Delta and the other parts of the province. On the other hand, a trend of balanced development within the inner Zhujiang Delta was identified when Weng (1998) conducted an interesting study on the spatial development of the delta region in the context of changing development strategies. His study did not cover the other parts of Guangdong and used prefecture-level units within the study area, yet he did find a trend of balanced development in the Zhujiang Delta since 1978. Early analysis of spatial development in Guangdong down to the county level was done by Fan (1995a, 1995b) who applied the concepts of development from above, below and outside in her analysis; she believed that these three modes of development co-existed in Guangdong. The polarization within Guangdong were documented from 1982 to 1990. She found the emergence of a regional core at the Zhujiang Delta and

the rise of Shenzhen and Zhuhai as growth poles. Making use of the indicator of per capita gross value of industrial and agricultural output (PCGVIAO), she found an increasing gap in the regional development in the period of 1982-1990, but this gap began to shrink in the following period of 1990-1993 due to the weakening polarizing effects of foreign investment.

Previous studies had often used single indicators like GDP per capita or PCGVIAO, and little had been done to explain the causes of the regional development process, with the exception of Fan. This paper will make use of various socio-economic indicators from various counties in Guangdong to conduct a systematic analysis of the processes and causes of spatial development over the period of 1980-1995. The purpose of this paper is to extend early studies to the whole of Guangdong on the basis of county-level units up to the mid-1990s, to examine trends of spatial development using a set of socio-economic indicators, instead of a single indicator, to represent the level of development in various areas, and to explain the different level of development in various areas using explanatory variables. The results will be useful to a better understanding of the complex regional development process under the socialist-market system in China, especially at the local level within a province.

The rest of the paper is organized as follows. Section two will review the major theoretical and conceptual development on spatial polarization and will examine the issues of the impact of the emerging market economic system on regional development in China. Section three will provide a general background descriptive of the research area, the county-level data set and a quick examination of spatial development using single indicators. Section four will conduct a systematic analysis of the changing spatial economic structure in the province using a multivariate analysis approach. Section five will conduct an exploratory analysis of the causes of the differential spatial development by regressing the development factor against a set of explanatory variables. Some conclusions are reached in section six.

2. New Regime of Regional Development in Post-reform China

Uneven spatial development is a fundamental issue in regional studies. Early conceptual development and explanation can be traced back to the stages of economic growth theory by Rostow (1960) and the core-periphery concept postulated by Friedmann (1969). Spatial polarization and polarization reversal have occurred in both developed and developing countries at different stages of development which have had a crucial impact on the regional development and spatial economic structure.

For example, spatial polarization began as early as the nineteenth century in the United States (US). The most significant indicator of polarization was the emergence, consolidation and widening of the northeast-midwest manufacturing belt that, until the 1960s, were undisputedly the economic core of the country (Bourne, 1980). Much of the research focused on the shift of capital, jobs and population from the old industrial core to new cores or to the periphery.

Since the 1960s and, most noticeably, in the 1970s, the dominance of the old industrial core and large manufacturing centres has been weakened with the shift of labour and capital out of the core. This has been called polarization reversal (Bourne, 1980) and may also occur in developing countries (Townroe and Keen, 1984). More recent evidence supports the postulation of an on-going deindustrialization process and the emergence of a post-industrial phase in many developed countries (Bluestone, 1988; Bluestone and Harrison, 1982; Hall, 1987, 1988; Kutscher and Personick, 1986).

In older and larger manufacturing centres, the exodus of capital has removed many high-income manufacturing jobs, a process which, in conjunction with limited growth in services, has led to a proliferation of low-wage jobs (Harrison, 1987; Peet, 1983). On the other hand, service-led growth in smaller urban centres has generated employment opportunities and income growth. High

technology industries and some new industries have replaced the traditional manufacturing industries and have played a more and more important role in the regional economic development (Erdeving, 1991).

Previously, top-down regional policies were adopted in developed countries to stimulate the development in less favoured regions (LFR) (Amin, 1999). The Keynesian approach used income redistribution, welfare policy and state incentives to firms in the 1960s and the 1970s while the neoliberal approach attempted to stimulate LFRs through investment in training, transportation, communication infrastructure and technology. These approaches only resulted in limited improvement in LFRs. More recently, a third institutional approach for regional development in the late 1990s has been proposed which has been based on mobilizing the endogenous potential of the LFRs. It is argued that industrial interdependence, ties of proximity and association as a source of knowledge and learning are the basis of regional/local advantage (Amin and Cohendet, 1999; Amin and Thrift, 1995; Cooke and Morgan, 1998; Storper, 1997). A host of new regional policies could be adopted based on this institutional perspective (Amin, 1999). Recent experience of rapidly growing coastal regions, such as Guangdong, also indicates the importance of the local government as a major actor (Oi, 1999; Walder, 1994, 1998).

The social and economic system plays an important role in the evenness of regional development. Firstly, even in the era of globalization, the capitalist state continues to provide institutional arrangements and strategic capacities which assure some minimal level of international economic governance facilitating the capital accumulation objectives of transnational capital (Dicken, 1992; Sassen, 1996; Yeung, 1998). Some scholars insist on "bringing the state back in" in the analysis of both capitalist and transitional economies (Lin, 1999, 2000; Skocpol, 1985).

Secondly, a different spatial pattern is expected in the socialist countries. Mingione (1981) argues that the socialist territorial order would be against the forms of concentration and division of labour developed by capitalism. Regional development would be

in the form of socialist decentralization. In Cuba, one finds efforts to achieve socialist equity objectives in all aspects of development planning, including spatial organization (Susman, 1987). A host of conditions have prevented this from being achieved to any significant degree (Slater, 1982).

During Mao's era, the Chinese government emphasized policies favouring balanced regional development (Wu, 1987). However, such kind of policies did not lead to the expected result. Zhao (1996) argues that the central planning mechanism can hardly be relied upon for regional equalization of economic development. There is no efficient mechanism to do that and also address conflict arising of the effort to achieve both economic development and even spatial distribution. Zheng et al. (1996) conclude that China's core and periphery situation has existed for over 40 years of evolution after 1949. The same is true of regional development within Guangdong province. Although some administrative and industrial core cities, such as Shaoguan, Zhanjiang and Shantou, were evenly distributed in the province, the province's development was concentrated in Guangzhou up to the late 1970s. Nearly 21 per cent of the national income of the province in 1980 was produced in Guangzhou.

The introduction of economic reform and open-door policy since 1978 has brought forth new forces causing spatial polarization. In 1994, China formally declared it was adopting a socialist-market system, with previously imposed constraints on the private economy being gradually removed over time (Han and Pannell, 1999; Oi, 1995; Walder, 1994, 1998). The socialist-market system means retaining the socialist political system but allowing capitalist-style economic liberalism, although the government's organizational, political and economic system is also changing to a variable extent (Cheng, 1998). It is clear that the mechanism of regional development in the post-reform China is fundamentally different from the one of the pre-reform Maoist period. It may be appropriate to call the pre-reform period as a phase of socialist planning using a top-down centralized development approach and the post-reform period as the phase of a socialist market using

a bottom-up decentralized development approach (Fan, 1995a). In the pre-reform phase of socialist planning, two major goals of central policy were regional equality and national defence. In the post-reform socialist market, the major goal of policy is economic growth. The existence of a regional division of labour has been recognized, and each region encouraged to make use of its own factor endowment or comparative advantage. A three economic belt and coastal development strategy was proposed on the basis of a so-called "ladder-step" doctrine in the 1980s (Fan, 1995b; Weng, 1998). The influence of Western theories of regional development also increased. Fan (1995b) finds that growth pole theory has emerged as an alternative to the "ladder-step" doctrine since the late 1980s. China's regional development policy in the reform period has clearly focused on the more developed coastal region (Fan, 1995b, 1997). However, there was renewed attention to regional diffusion into the inland region by the mid-1990s (Fan, 1997).

There are two components to the broad development of the political economy and the new regime of the socialist-market economy in China after 1978. The first is the economic reforms, through which the central planning system is gradually being replaced by the market mechanism. For example, state investment plays a decreasing role in local investment. Among the total of 266.8 billion *yuan* invested in fixed assets in Guangdong in 1998, only 4.4 billion *yuan* are from the state budget, 39.1 billion *yuan* are domestic loans from banks. On the other hand, 115.7 billion *yuan* are raised by local governments and enterprises, 37.2 billion *yuan* are from foreign investment and 70.4 billion from various other sources (Guangdong Statistical Bureau, 1999). The Chinese economy has also been steadily decentralized with increasingly power being transferred to regional and local governments. Such changes have a most important impact on areas/cities traditionally possessing only a small number of state-owned enterprises (SOE) in the pre-reform period, such as Guangdong's. During the process, local governments, firms and residents acquire great power and develop flexibility in their management, operation and

competition with others. This has the effect of raising the efficiency of utilizing capital, land, human resources and economic opportunities. In many localities in Guangdong where SOEs are rare, both collective township industries and private firms have increased and expanded greatly since the late 1970s. The local governments at both the city/county and town/township level with substantial institutional changes are believed to have played a key role both as organizers and participants in the local economy (Lin 1997; Shen, 1999a). This is similar to other areas in rural China which have been labelled as "local state corporatism" by Oi (1995, 1999). Oi has argued that rapid economic growth in rural China is due to the successful intervention by local government, similar to Japan's and the East Asian newly industrializing economies'. Due to decentralization and realignment of property rights through decollectivization and fiscal reform, the local officials at the village, township and county level are motivated to initiate and promote local economic development. Possibly due to a close and intimate relationship between local officials and peasant entrepreneurs, local officials are generally supportive rather than simply extorting excessive monetary returns using their political power. This may also explain why China's economy grows rapidly despite reported widespread corruption.

In recent years, some local governments in the Zhujiang Delta have also attempted to transform their role of direct economic participant to indirect macro-economic administrator and monitor. However, regional, cultural and political barriers still exist in some areas, as most local investors tend to invest in their own localities and there is little cross-boundary investment. Since the middle of the 1980s, there have been more and more competition and conflict among various regional/local governments (Cannon and Zhang, 1996; Wei, 1996). The strong localism is due to the decentralization of economic decision-making and the inadequate regulation by the central government to ensure fair competition and open trade. Land development for industry can bring huge financial returns to local government in the form of land rent and taxes. Thus, localities are interested in concentrating the

development in their own land and attracting potential investors. On the other hand, "relationship" with the local officials may have an important impact formally and informally on business operation. Peasant entrepreneurs are likely to enjoy a good relationship locally, better than in other places, causing them to invest and re-invest mainly locally. Such phenomenon of course has a negative impact on economic diffusion, worsening the gap between the developed and less developed regions. The gap will only be reduced when the development spills over to the less developed areas, or such areas are able to break the under-development through their own initiative, external relation and particular opportunities. In this sense, the initial stimulus and the historical base are important to make the initial development to happen in certain localities. Subsequent institutional support and capital accumulation are important to keep the growth engine running. No doubt foreign investment in China is one of such stimuli to the economic development in the country, and Guangdong seems to have benefited the most from this.

The second component is the open-door policy. Many local governments in Guangdong have special incentives to attract investment from Hong Kong, Macau, Taiwan and foreign countries. All such investment is treated as foreign investment. The development and urbanization induced by foreign investment have been conceptualized as development from outside (Fan, 1995b) and exo-urbanization (Sit and Yang, 1997). Owing to the proximity of Hong Kong to Guangdong, the Zhujiang Delta in particular, about half of the total investment from Hong Kong into mainland China lands in Guangdong, and for the whole province, about 80 per cent of foreign investment originates in Hong Kong. Indeed, mainland China, Guangdong, Zhujiang Delta and Hong Kong form a particular spatial economic system. Hong Kong could be regarded as a growth pole in this huge spatial system, and its industrial and economic activities have been diffused to the surrounding areas (Leung, 1996; Shen, 1999b; Sit, 1998; Soulard, 1997). The Zhujiang Delta region has benefited the most, and it has become the growth core of Guangdong province and China.

The impact of the open-door policy and foreign investment on regional development could not be under-estimated. But, the direct contribution of the capital from Hong Kong in the total local investment is generally less than 30 per cent (Shen et al., 1998, 1999). The indigenous local economic activities induced by the new socialist-market regime are also important to the overall regional development in Guangdong.

There is no doubt that the process of regional development in the post-reform China would be closer in nature to that of the capitalist countries than the pre-reform period. However, China still has its unique characteristics; the central and the local government in particular have a huge influence in the development process. Either polarization or economic diffusion could occur depending on the stage of development and the particular circumstances of a region. It would be of great interest to examine and explain the differential regional development at the local level within any particular province. General theories, such as local state corporatism, help us to understand how the local economy works, but they do not explain why a particular locality grows faster than other areas. Detailed empirical analysis is needed to find out the status of regional development among various localities. These findings would then provide insights to formulate a regional development theory which would encompass various factors. The empirical analysis in the next few sections will attempt to reveal the changes of spatial development and their causes in Guangdong province.

3. Background of the Study Area

Guangdong province, adjacent to Hong Kong and Macau, is located at the south gate of the country. Before the introduction of economic reform and open-door policy in 1978, Guangdong had received little investment, and its industrial and transportation infrastructures were inadequately developed. The development of cities and towns was also slow. From 1949 to 1978, the ratio of

the non-agricultural population in Guangdong remained around 15-16 per cent. The average annual growth rate of the urban population was only 1.61 per cent, much lower than the national average of 1.72 per cent, because the province was not a key region of national construction in the pre-reform period. Both state investment and local initiatives were inadequate in this period.

Economic reform and open-door policy were introduced in China in 1978. Guangdong province was chosen as a test-bed to implement various new policies "one-step ahead" of other regions. Guangdong and Fujian were approved by the State Council to adopt special and flexible open-door policies in July 1979. Four special economic zones were formally established in these two provinces in 1980. In February 1988, Guangdong was approved by the State Council to become an experimental area for comprehensive socio-economic reforms (Shen et al., 1999). Since 1978, Guangdong province has taken full advantage of the "one-step ahead" policy. It is one of the first provinces in the People's Republic of China to benefit from the open-door policy and become the province with the strongest economic power (largest GDP) among all provincial regions in China.

In the past two decades, the province has efficiently taken advantage of its unique coastal location neighbouring Hong Kong and Macau, good connection with a large number of overseas Chinese and abundant labour resources. Great progress in industrialization and urbanization since the late 1970s has been well acknowledged (Yeung and Chu, 1998). In some economically developed areas, especially in the Zhujiang Delta, cities and towns have developed well and the level of urbanization is approaching 50 per cent. Many rural migrants, both in and out of the province, have moved into cities and towns accelerating the process of urbanization (Fan, 1996; Shen, 1999a, 1999b).

Guangdong province consisted of 21 prefecture-level cities (*diji shi*), 32 county-level cities, 43 counties and 3 autonomous counties in 1995. It is noted that a prefecture-level city has a core urban area and may also administrate other county-level units.

The basic area unit used in this paper is the county, the county-level city or the core urban area of a prefecture-level city. Figure 1 presents the administrative division of Guangdong province. During the study period, there have been many changes in the administrative system in Guangdong. A majority of them involves the designation of a county as a county-level city. In some cases, the name of a county may also be changed after designation as a city. So the counties of Haikang, Hua Xian and Lian Xian were re-named as Leizhou city, Huadu city and Lianzhou city, respectively. Baoan county was cancelled and its area became urban districts under the administration of Shenzhen city; they are treated as one area unit in this study. In some other cases, a county was designated as a prefecture-level city and its area divided into two parts: the core urban area of the new prefecture-level city and the remaining part as a new county. The whole of the old county should be treated as two area units in this study. However, only the data for the whole of the old county as one unit were available in some years, thus such old county area has been treated as one area unit in this study. There are five such cases: Yangdong, Qingxin, Dongyuan, Jiedong and Chaoan are combined with the core urban areas of Yangjiang, Qingyuan, Heyuan, Jieyang and Chaozhou cities as area units in this study, respectively. Thus, there is a total of 94 area units in this study. This paper will examine the trends of spatial development among these area units.

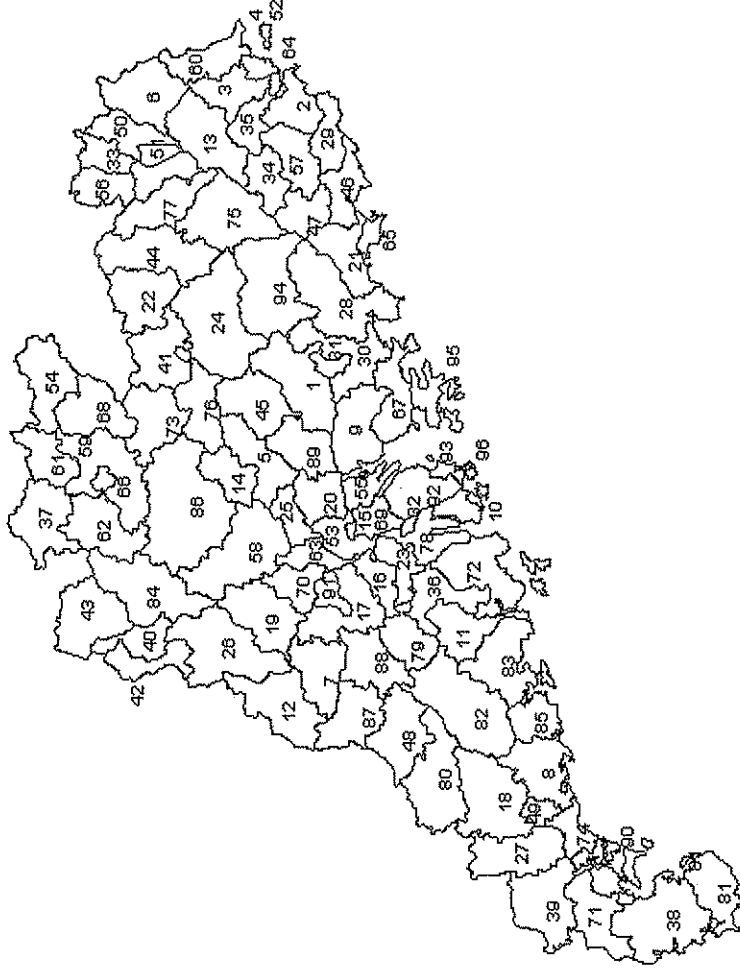
As mentioned above, many scholars use a single indicator to measure the level of development and to analyze spatial inequality and the polarization of spatial development. The most commonly used indexes are GDP per capita, national income per capita, income per capita or gross value of industrial and agricultural output (Wei and Ma, 1996; Weng, 1998). Gini coefficient has often been used to measure spatial inequality (Dunford, 1993). It is argued that spatial polarization and development is the result of complex interaction among various factors. It is also more reliable to measure the level of development using a set of indicators rather than just one single indicator, like GDP per capita. Thus, a

multivariate analysis is more useful to analyze the trend of the spatial development process.

A set of ten socio-economic variables has been chosen and is listed in Table 1. The first six variables, describing income in urban and rural areas, the level of urbanization, production and consumption capacity, are related to various dimensions of development, while the remaining four variables, describing the level of saving, local revenue and investment, are considered to have a significant impact on economic development. The data on these variables were collected from official sources for various county-level units in the selected years of 1980, 1985, 1990 and 1995 (Guangdong Statistical Bureau, 1981, 1986, 1991, 1996). These years correspond to the final year of four five-year plans in China from 1980 to 1995. The year 1980 was close to the beginning of the implementation of the economic reform and open-door policy, marking the new regime of socialist-market system. The official data are the only possible source for the kind of study in this paper. The data are generally consistent with personal observations, although they may not be as precise as they seem to be.

Before conducting detailed multivariate analyses of spatial development and polarization in the next two sections, this section will examine initially the spatial dynamics by focusing on two important indicators, namely, the ratio of national income per capita of a city/county to the average of the province and the percentage share of the national income of a city/county in the province. These two indicators describe the relative level of development and the economic strength of a city/county in the provincial economy. The changes to these indicators over the period of 1980-1995 describe the rise and fall of individual cities/counties, thus the trends of spatial polarization and development.

Table 2 presents the top and the bottom ten cities and counties in terms of national income per capita in 1980 and their changing positions as to the level of development in the province in the period of 1980-1995. According to Table 2, the relative level of development in some old central cities, such as Guangzhou, Jiangmen and Shaoguan, had dropped continuously. Guangzhou,

Figure 1 The Administrative Division of Guangdong Province, 1995**Notes:**

1. Boluo
2. Chaoyang
3. Chaozhou
4. Chenghai
5. Conghua
6. Dapu
7. Deqing
8. Dianbai
9. Dongguan
10. Doumen
11. Enping
12. Fengkai
13. Fengshun
14. Fogang
15. Foshan
16. Gaoming
17. Gaoyao
18. Gaozhou
19. Guangning
20. Guangzhou
21. Haifeng
22. Heping
23. Heshan
24. Heyuan
25. Huadu
26. Huaiji
27. Huazhou
28. Huidong
29. Huilai
30. Huiyang
31. Huizhou
32. Jiangmen
33. Jiaoling
34. Jiexi
35. Jieyang
36. Kaiping
37. Lechang
38. Leizhou
39. Lianjiang
40. Liannan

41. Lianping
42. Lianshan
43. Lianzhou
44. Longchuan
45. Longmen
46. Lufeng
47. Luhe
48. Luoding
49. Maoming
50. Mei Xian
51. Meizhou
52. Nan'ao
53. Nanhai
54. Nanxiong
55. Panyu
56. Pingyuan
57. Puning
58. Qingyuan
59. Qujiang
60. Raoping

61. Renhua
62. Ruyuan
63. Sanshui
64. Shantou
65. Shanwei
66. Shaoguan
67. Shenzhen
68. Shixing
69. Shunde
70. Sihui
71. Suixi
72. Taishan
73. Wengyuan
74. Wuchuan
75. Wuhua
76. Xinfeng
77. Xingning
78. Xinhui
79. Xinxing
80. Xinyi

81. Xuwen
82. Yangchun
83. Yangjiang
84. Yangshan
85. Yangxi
86. Yingde
87. Yu'nan
88. Yunfu
89. Zengcheng
90. Zhanjiang
91. Zhaoqing
92. Zhongshan
93. Zhuhai
94. Zijin
95. Hong Kong
96. Macau

Hong Kong and Macau are not part of Guangdong province.

Table 1 Socio-economic Variables

Code	Variables	Units
V ₁	Per capita social product (PSP)	10,000 yuan
V ₂	Per capita national income (PNI)	10,000 yuan
V ₃	Per capita income of rural household (PRHI)	yuan
V ₄	Average wage of urban employee (UWAGE)	yuan
V ₅	Per capita total retail value of goods (PGR)	10,000 yuan
V ₆	Percentage of non-agricultural population in total population (PNP)	%
X ₁	Per capita investment in fixed assets (PIF)	yuan
X ₂	Per capita local fiscal revenue (PLR)	10,000 yuan
X ₃	Per capita savings in both urban and rural areas (PURS)	10,000 yuan
X ₄	Per capita foreign direct investment (PFDI)	10,000 US\$

the provincial capital, was ranked the number one in 1980, but by 1995, Shenzhen, Zhuhai and Foshan had a higher national income per capita than Guangzhou. The relative level of development in most of the bottom ten cities changed little. Only Huaiji, Jieyang, Huazhou and Puning had improved their relative level of development from the bottom to a medium position in the province. It is clear that the rising new economic centres, such as Shenzhen and Zhuhai, play a key role in re-shaping the spatial economic structure. Many cities and counties in the province share similar macro reform and open policies approved by the central/provincial government. Their different economic performance may need to be explained by their particular initial economic conditions, human resource base and geographical location, linkages with Hong Kong and Macau and the efforts made by local governments and entrepreneurs.

Table 3 presents the top and the bottom ten cities and counties in terms of national income in 1980 and their changing economic

Table 2 The Ratio of National Income per Capita of a City or County to the Average National Income per Capita of Guangdong Province, 1980-1995

City or county	1980		1985		1990		1995	
	Ratio	Rank	Ratio	Rank	Ratio	Rank	Ratio	Rank
Guangzhou	3.67	1	3.21	4	2.55	5	2.32	4
Shenzhen	3.35	2	11.25	1	9.46	1	7.64	1
Jiangmen	3.34	3	3.19	5	2.78	4	1.76	11
Shaoguan	3.16	4	2.81	6	2.28	6	1.40	15
Foshan	2.92	5	4.01	3	4.47	3	3.48	3
Zhuhai	2.21	6	4.52	2	5.35	2	4.91	2
Nanhai	1.75	7	2.04	8	1.90	8	2.04	6
Panyu	1.59	8	1.85	10	1.77	13	1.87	7
Shunde	1.57	9	2.04	9	1.90	9	1.84	8
Zhaoqing	1.54	10	1.12	18	1.54	17	1.44	14
Huaiji	0.52	85	0.43	82	0.46	75	0.53	55
Fengshun	0.51	86	0.43	81	0.33	91	0.28	87
Jieyang	0.51	87	0.56	68	0.58	61	0.72	37
Chaoyang	0.50	88	0.41	86	0.41	82	0.41	69
Huazhou	0.49	89	0.58	65	0.61	56	0.55	52
Luhe	0.45	90	0.42	85	0.32	92	0.27	88
Dapu	0.43	91	0.39	88	0.38	85	0.29	86
Puning	0.41	92	0.42	83	0.37	86	0.51	58
Zijin	0.41	93	0.41	87	0.42	80	0.24	91
Huilai	0.39	94	0.42	84	0.49	71	0.41	70
Total	1		1		1		1	

Note: This table only includes the top and bottom ten counties or cities of year 1980.

Table 3 The Share of National Income of a City or County in Guangdong Province, 1980-1995

City or county	1980		1985		1990		1995	
	Percentage (%)	Rank	Percentage (%)	Rank	Percentage (%)	Rank	Percentage (%)	Rank
Guangzhou	20.90	1	18.40	1	14.40	1	13.94	1
Dongguan	3.12	2	3.83	3	4.50	3	3.62	3
Zhongshan	2.67	3	3.27	4	3.38	4	2.72	6
Nanhai	2.65	4	3.02	5	2.97	5	3.28	4
Shunde	2.34	5	3.00	6	2.76	6	2.90	5
Panyu	1.97	6	2.26	7	2.14	8	2.48	8
Zhanjiang	1.97	7	1.75	11	2.09	10	2.05	11
Shaoguan	1.86	8	1.78	8	1.48	15	1.03	27
Xinhui	1.66	9	1.64	12	1.65	13	1.38	15
Taishan	1.64	10	1.62	13	1.48	14	1.12	21
Shenzhen	0.59	58	4.54	2	5.91	2	11.82	2
Huizhou	0.28	85	0.31	78	0.69	45	1.12	22
Shanwei	0.28	86	0.34	76	0.40	72	0.27	73
Fogang	0.26	87	0.24	82	0.18	87	0.15	85
Renhua	0.25	88	0.21	87	0.19	86	0.16	84
Jiaoling	0.23	89	0.22	85	0.22	84	0.21	80
Xinfeng	0.20	90	0.19	89	0.14	90	0.13	88
Lianshan	0.19	91	0.13	91	0.11	91	0.06	94
Liannan	0.16	92	0.12	92	0.10	93	0.07	93
Luhe	0.15	93	0.14	90	0.11	92	0.10	91
Nan'ao	0.06	94	0.06	94	0.07	94	0.07	92
Province	100		100		100		100	

Note: This table includes the top and bottom ten counties or cities in 1980, plus Shenzhen.

strength in the province in the period of 1980-1995. Most of the top areas belong to the Zhujiang Delta. Shenzhen is included because of its significant growth in this period. According to Table 3, Guangzhou was the single largest economic centre in 1980, which accounted for 20.9 per cent of the national income of the province. Among the top ten cities/counties in 1980, six areas, including Dongguan, Zhongshan, Nanhai, Shunde, Panyu and Zhanjiang, further increased their share of national income of the total national income of the province in the period of 1980-1990. The first five areas belong to the Zhujiang Delta. However, their shares decreased again in the period of 1990-1995, except those of Nanhai, Shunde and Panyu. On the other hand, among the bottom ten cities/counties in 1980, the eight areas of Shanwei, Fogang, Renhua, Jiaoling, Xinfeng, Lianshan, Liannan and Luhe further decreased their share of national income in the period of 1980-1995. Only Huizhou and Nan'ao were able to increase their share of economic power in these years. The share of Huizhou in the total provincial national income increased impressively from 1980 to 1995. It is noted that the share in six out of the top ten areas increased, while those of eight out of the bottom ten areas declined in the same period. A spatial polarization process was going on in the province. Nevertheless, the most significant change in the spatial economy was the fall of Guangzhou and the rise of Shenzhen and the formation of two provincial growth poles. By 1995, the share of national income in Guangzhou had decreased from 20.90 per cent in 1980 to only 13.94 per cent and the share of national income in Shenzhen had increased from only 0.59 per cent in 1980 to 11.82 per cent in 1995. The rise of Shenzhen is not simply a result of diffusion or polarization reversal from Guangzhou, but rather the result of a series of external and internal factors operating in Shenzhen (Shen, 1999b; Shen et al., 1999). Special economic reforms, open-door policy and the Hong Kong factor have made Shenzhen a popular destination for capital from mainland China, Hong Kong and elsewhere. These are perhaps the most important driving forces behind the rise of Shenzhen.

The initial descriptive analysis in this section provides a foundation for further multivariate analyses in the next two sections. It is clear that there are marked geographical variations in regional development in Guangdong province. The cities in the Zhujiang Delta have developed more rapidly than the peripheral areas. While regional inequality may have been enlarged between the coastal and inland areas, it also did so between the urban and rural areas of the province. These will be examined in detail using a multivariate approach in the next section.

4. Multivariate Analysis of Spatial Polarization in Guangdong Province

As mentioned before, six variables have been selected to describe the overall level of development representing the various dimensions of development (Table 1). These variables are likely to be correlated to various degrees. Factor analysis, a statistical technique for identifying a small number of important factors to represent many interrelated variables, is applied to the data set of six variables of Guangdong province. One principal factor for each year is obtained which accounts for over 75 per cent of the variance. These factors account for 75.93 per cent, 80.60 per cent, 82.10 per cent and 81.62 per cent of the total variance for 1980, 1985, 1990 and 1995, respectively. The component matrix and factor contributions to the overall variance are showed in Table 4. The main factor for each year may be called the development factor integrating six original indicators of development. Two variables, per capita social product (V_1) and per capita national income (V_2) are clearly the most important variables of the development factor. It is also interesting to note that the percentage of non-agricultural population in total population (V_6) is important in the period of 1980-1990 but becomes less important in 1995. This is due to the fact that the percentage of non-agricultural population has become a less perfect indicator of urbanization in the post-reform period. According to China's household registra-

Table 4 The Component Matrix and Percentage of Factor Contribution in Total Variance, 1980-1995

Variables	Factor components			
	1980	1985	1990	1995
V_1	0.929	0.972	0.981	0.975
V_2	0.959	0.971	0.978	0.970
V_3	0.757	0.828	0.822	0.842
V_4	0.803	0.892	0.855	0.888
V_5	0.842	0.786	0.825	0.963
V_6	0.920	0.921	0.959	0.764
Percentage of factor contribution (%)	75.93	80.60	82.10	81.62

tion (*hukou*) system, a person is registered either as agricultural population or non-agricultural population. The majority of non-agricultural population is found in urban China and is closely related to urbanization. But, there has been an increasing number of agricultural population in Chinese cities, mostly in the form of temporary population in the 1980s and 1990s. Per capita income of rural household (V_3) is also not very important in 1980 when the economic reform is just beginning; the variable becomes more important in later years. On the other hand, per capita total retail value of goods (V_5) rises in importance as much as per capita social product and per capita national income in 1995. All these indicate the increasing importance of the market economy and rural development in the province in the 1990s. However, the percentage of non-agricultural population in total population — a factor still tightly regulated — becomes less useful as an indication of the level of development by 1995.

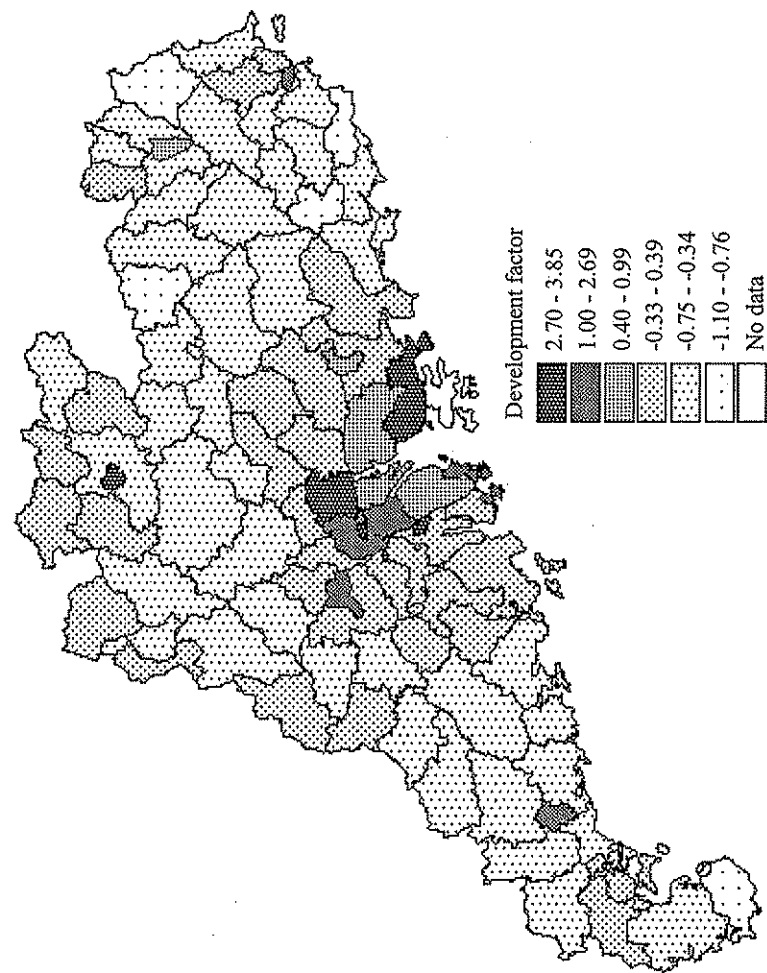
Factor scores for each city/county can then be calculated for 1980, 1985, 1990 and 1995 to represent the level of development in

each. Ninety-four cities/counties can be divided into six different groups based on their factor scores, the results of which can be mapped out to present the situation of spatial polarization in various years.

Figure 2 presents the spatial structure of development in 1980. The first group representing the highest level of development has five areas, including Shenzhen, Guangzhou, Shaoguan, Foshan and Jiangmen, all of which, except Shaoguan, are located in the Zhujiang Delta. Shenzhen was designated as Special Economic Zone (SEZ) in 1980 and had high values on various indicators of development. Thus, Shenzhen was above Guangzhou in terms of comprehensive development level on a per capita basis, although its national income per capita was smaller than Guangzhou in 1980. Guangzhou as the main economic centre and capital of the province ranked second in terms of comprehensive development level. Shaoguan is adjacent to one of the main north-south national railway — Jing-Guang Railway (from Beijing to Guangzhou). It is also rich in mineral resources. The city thus was an important core city in the north mountainous area under the pre-reform socialist planning system. Its level of development ranked third in 1980 in the province. Foshan and Jiangmen had already established a good industrial and agricultural base by 1980. Their level of development was ahead of many other areas in the province.

The second development group has six areas, including Zhuhai, Zhaoqing, Shantou, Nanhai, Shunde and Maoming. Among them, Zhuhai and Shantou are cities designated as SEZs. Zhaoqing and Maoming are also core cities at the north and west periphery. Nanhai and Shunde along Zhuhai are also part of Zhujiang Delta. It is clear that the areas in the first two development groups are mainly composed of either cities in the Zhujiang Delta or the subregional core cities with administrative functions. The spatial pattern of development in 1980 still largely reflected the accumulated result of the pre-reform political economy, with the exception of the SEZs. This also meant that, under the socialist planning system, the spatial economic development also displayed a certain degree of inequality in the whole province. But,

Figure 2 The Spatial Structure of Guangdong Province, 1980

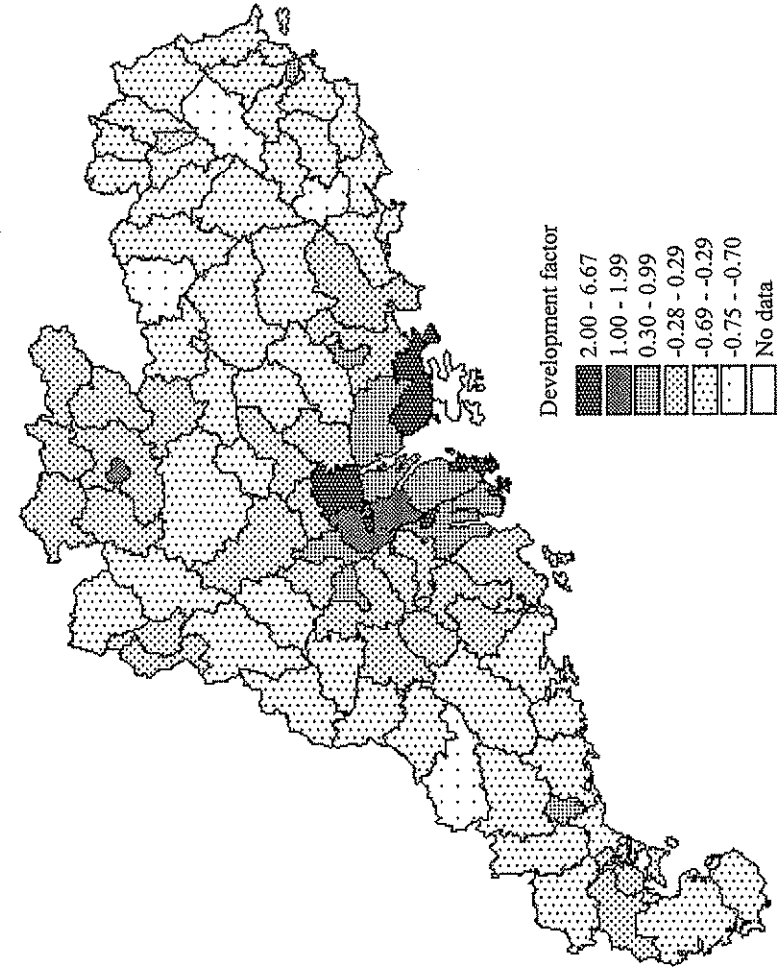


subcentres were established in various regions instead of concentrating all resources and development in one single centre or region. This partly reflected the pre-reform philosophy of balanced regional development.

The third and fourth development groups mainly include the cities/counties near or within the Zhujiang Delta in addition to some prefecture-level administrative centres (PAC). Among them, Huizhou, Dongguan, Meizhou and Zhanjiang are all PACs. The fifth and sixth development groups consist of areas in the north mountainous area, the western and eastern parts of the province, which are the peripheral areas. Although Guangdong province pursued a balanced development policy under the planning system before 1978, there was still an obvious core-periphery structure with a development core in the Zhujiang Delta. Within Zhujiang Delta, except for core cities like Guangzhou and Shenzhen, the development gap among the remaining counties or cities was not clear. In the peripheral area, the PAC acted as the economic growth centre with strong influence on their hinterland administration.

Figure 3 presents the spatial structure of development in 1985. Guangdong's economic development was beginning to enter a new stage, especially in the cities or counties in the Zhujiang Delta and the coastal areas. Compared to 1980, Shenzhen was still the top city with the highest level of development. There was no change in the first development group, apart from Shaoguan being downgraded to the second development group and replaced by Zhuhai. The second development group in 1985 included Shaoguan, Nanhai and Shunde. Between 1980 and 1985, there was significant changes in the membership of development groups and the ranking of individual cities and counties. For example, Shaoguan, Zhaoqing, Maoming, Shantou, Huizhou, Meizhou and Zhanjiang were downgraded, while Zhuhai, Foshan, Zhongshan, Nanhai, Shunde and Panyu were upgraded. The cities or counties downgraded were all in the peripheral area while the upgraded cities and counties were all in the Zhujiang Delta. Compared with 1980, the number of areas in the third and

Figure 3 The Spatial Structure of Guangdong Province, 1985



fifth development groups grew larger in 1985, while the number of areas in the fourth and sixth development groups smaller. Most importantly, the absolute gap in the factor score derived from factor analysis between the most developed city and the poorest county increased significantly from 4.93 to 7.41 in the period of 1980-1985. Thus, the spatial inequality increased from 1980 to 1985. The spatial polarization of development was strengthened with faster development in the Zhujiang Delta.

In the period of 1980-1985, the economy of the Zhujiang Delta was booming with a high economic growth rate. However, the development was still concentrated in the core area of the Zhujiang Delta, such as Shenzhen, Foshan and Jiangmen. Zhuhai emerged as a new growth centre because of its special policy status, while the economic position of Guangzhou weakened. For the province as a whole, the concentration of economic power in the Zhujiang Delta meant a spatial polarization process, as, at the same time, the relative economic strength of peripheral areas began to decline. Although Shaoguan, Shantou, Meizhou, Maoming, Chaozhou and Zhanjiang were still the local central cities at the periphery, they appeared to be less powerful at triggering the local economy in their hinterland.

Figure 4 presents the spatial structure of development in 1990. In 1990, the areas in the first development group remain the same as in 1985, although Guangzhou's position is taken over by Jiangmen. Huizhou and Shantou are upgraded to the second development group. In the third development group, the ranking of Maoming and Zhaoqing decreases. The areas of the first three development groups mainly include the cities in the Zhujiang Delta plus a few PACs at the periphery. The areas of the next three development groups do not change too much between 1985 and 1990. However, there are fewer areas in the fourth development group in 1990 than in 1985. The gap between the top and bottom area, Shenzhen and Heping, is still as high as 7.32.

The rise of Huizhou is noticeable in this period. It is a medium-sized city located at the eastern fringe of Zhujiang Delta. There has been rapid economic growth in Huizhou since 1985. Its

Figure 4 The Spatial Structure of Guangdong Province, 1990

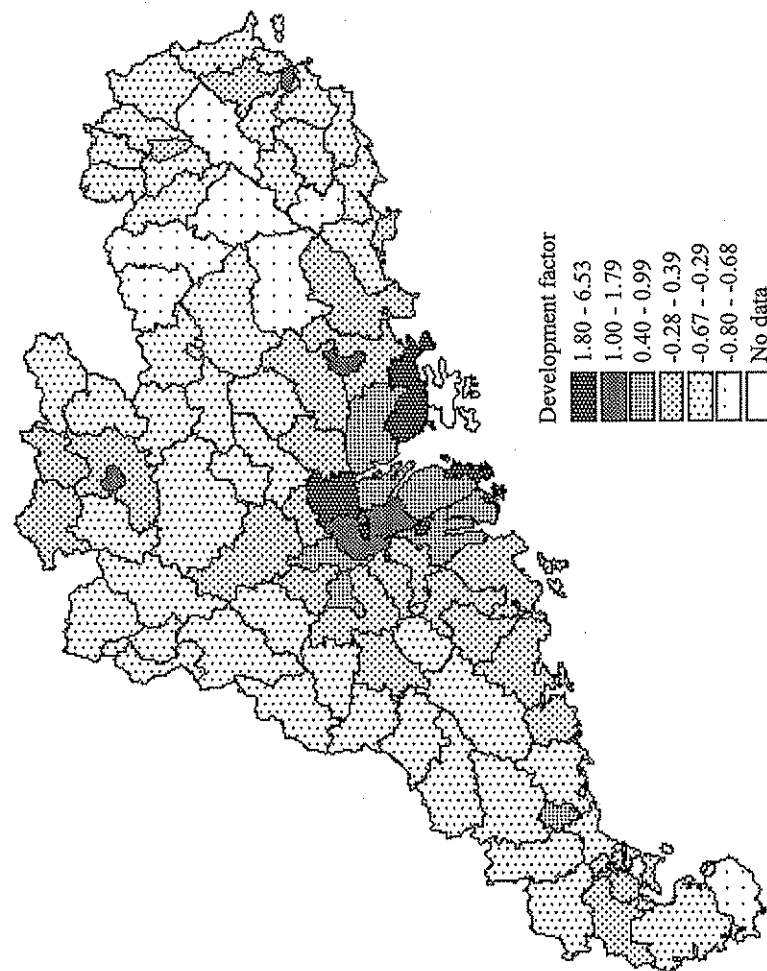


Figure 4

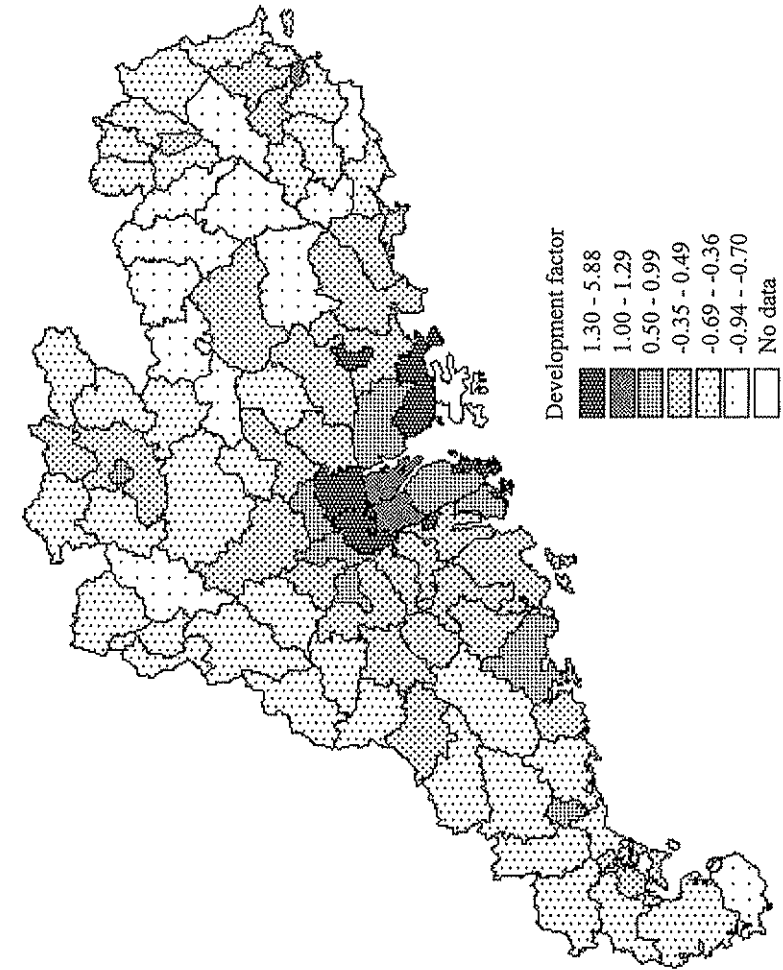
The Spatial Structure of Guangdong Province, 1990

position in the whole province is ranked twelfth in 1980 and sixteenth in 1985, but sixth in 1990. At this stage, a pattern of diversified development among the cities of the Zhujiang Delta emerges. On the one hand, as a new growth centre, Shenzhen has become more and more important in the Zhujiang Delta and the whole province as well. Zhuhai, Foshan, Jiangmen, Dongguan, Shunde, Nanhai, Zhongshan and Panyu are now booming cities; Dongguan, Shunde, Nanhai and Zhongshan are even called the "four little tigers" of south China because of their rapid economic growth. On the other hand, Guangzhou's importance in the province's economy has further been reduced. Meanwhile, there is evidence that the economic development begins to diffuse towards the peripheral area of the Zhujiang Delta, especially towards the east coastal area. Thus, some spillover effects are occurring in areas close to the core. However, the position of Shaoguan, Maoming and Zhanjiang as subregional economic centres at the periphery, has further weakened. The spatial inequality in economic development in the whole province has increased in the period of 1985-1990. It is very clear that the position of the Zhujiang Delta as the core region and the spatial structure of provincial core and periphery has further strengthened.

Figure 5 presents the spatial structure of development in 1995. In the period of 1990-1995, there is further economic concentration towards the Zhujiang Delta. Compared to 1990, Huizhou and Nanhai are upgraded into the first group. The relative economic strength of areas in the peripheral region further declines. Shaoguan is downgraded again to the third group, with its rank falling from seventh in 1990 to fifteenth in 1995. The position of Meizhou also falls dramatically, while Chaozhou and Zhanjiang improve their economic position. Moreover, no area of the peripheral region is in the first two groups in 1995. Nevertheless, the gap in the factor score between the top and bottom area, Shenzhen and Heping, has dropped slightly from 7.32 in 1990 to 6.82 in 1995.

The position of Shenzhen and Zhuhai as the leading economic centres has been well established in the Zhujiang Delta and the

Figure 5 The Spatial Structure of Guangdong Province, 1995



province by 1995. Meantime, Panyu, Zhongshan, Dongguan, Shunde, Jiangmen, Nanhai and Foshan strengthen their position as growth poles of the Zhujiang Delta. An economic growth corridor along the Shenzhen-Guangzhou-Zhuhai highway has emerged. Because of industrial restructuring and the continuous search by capital for low cost production, the areas near the Zhujiang Delta begin to pick up the pace of development. There is a tendency for the manufacturing industry, technology and the labour force to move into such areas, with some spillover effect of regional development occurring. Conversely, peripheral areas far away from the growth core are still left behind in regional development.

The above analysis reveals the process of spatial polarization in Guangdong province from 1980 to 1995. Although the core-periphery structure existed in 1980, the regional development in the province has become more and more uneven over the past 15 years. The most rapidly developing Zhujiang Delta has become the indisputable economic growth centre of the province. The areas along the Guangzhou-Shenzhen-Zhuhai Highway Development Corridor have become more prosperous than other areas, while the relative position of the peripheral areas has continued to decline. Some traditional central cities of the peripheral areas, such as Shaoguan, Maoming, Zhanjiang, Chaozhou, Meizhou and Zhaoqing, have gradually lost their role as subregional growth centres. Since 1990, regional polarization has continued although the economic concentration into the Zhujiang Delta has slowed down. Nevertheless, the Zhujiang Delta remains the single growth pole at the provincial level. Some new growth centres have emerged within the Zhujiang Delta resulting in the re-distribution of population and manufacturing industry. They form growth poles at the subregional level within the Zhujiang Delta. As a result, the core-periphery structure has been strengthened in the past 15 years. The performance of the traditional economic centre, Guangzhou, has been dwarfed by the rapid rise of the new cities of Foshan and Zhuhai. In terms of the level of comprehensive development factor on a per capita basis, Shenzhen remains

at the top throughout the whole period, its total economic power expanding dramatically with massive capital investment, labour migration and urban construction (Shen, 1999b; Shen et al., 1999).

5. Exploring the Causes of Differential Spatial Development and Polarization

Regional economic development is the result of the introduction of factor inputs, progress in technology, improvement in infrastructure, internal and external trading conditions and conducive government policy and institutional structure. It would not be possible to provide quantitatively an accounting of the contribution of each of these factors. For example, local government has been identified generally as an active agent in the rapid economic development in many areas of China by the theory of "local state corporatism" (Oi, 1995, 1999). But, it would be difficult both qualitatively and quantitatively to explain the "difference" in economic performance in various areas by the "different" performance of local government. Some theoretically feasible analysis may also be constrained by the availability of data. The objective of this section is not to explain the general factors or processes of economic development in Guangdong but to explore the possible spatial factors related to the "different" economic development among its 94 county-level areas. More specifically, this section will examine the relations between the development factor established in the previous section and four explanatory variables that are expected to have an important impact on regional economic development in various areas. These four variables are per capita investment in fixed assets (PIF, X_1), per capita local fiscal revenue (PLR, X_2), per capita savings in both urban and rural areas (PUS, X_3) and per capita foreign direct investment (PFDI, X_4). It is useful to note that a small portion of FDI may originate in mainland China which is re-invested at home via Hong Kong to qualify for FDI privileges. But, there is no complete data about such investment that is likely to account for a small proportion of FDI. The

four variables above are related to the capacity for investment that may be the key in capital-deficient developing countries like China.

A simple correlation analysis is first conducted to show the relationships between the score of development factor (Y) and the four explanatory variables; the result is shown in Table 5. In 1980, PLR and PURS were highly correlated, with the development factor having a correlation coefficient of over 0.83. Either one of these two variables could explain 70 per cent of the variation in the development factor among the 94 areas. The year 1980 was just at the beginning of the next two decades of economic reform and open-door policy implementation. The regional development was still very much influenced by government. Thus, the financial health of government and the local saving capacity were most important in determining the level of development in various areas. Fixed capital investment and FDI played much less of a role. However, both of these two variables became increasingly important for regional development later, and either one of them was able to explain over 53 per cent of the variation in the development factor in the province. This is not surprising as the efficiency of capital investment goes up with increasing competition in the market. FDI significantly increased in the province in the 1990s, thus becoming an important driving force of regional development. Nevertheless, the financial health of government and the local saving capacity were still the most important factors of development in 1985, 1990 and 1995. The local government had transformed its role from economic planner and producer to economic participant and organizer. Furthermore, due to increased autonomy and competition, the local government had become more efficient under the socialist-market system than in the pre-reform period.

Multiple regression analysis is conducted in the following to examine the overall impact of four variables on the development factor. For each year, a backward method was used to remove insignificant variables from an initial regression equation including all four independent variables. The issue of spatial autocor-

Table 5 Correlation Coefficients between Explanatory Variables and the Development Factor, 1980-1995

Variables	1980		1985		1990		1995	
	R	R ²	R	R ²	R	R ²	R	R ²
PIF	0.688	0.473	0.881	0.776	0.890	0.792	0.873	0.762
PLR	0.835	0.697	0.905	0.819	0.911	0.830	0.904	0.817
PURS	0.858	0.736	0.923	0.852	0.953	0.908	0.845	0.714
PFDI	0.519	0.269	0.807	0.651	0.845	0.714	0.727	0.529

relation among regression residuals is of concern in such regression analysis. Generally, spatial autocorrelation could result from a mis-specification of the regression model. Extra independent or spatial variables could be included in a regression model if spatial autocorrelation is detected (Cliff and Ord, 1973; Hepple, 1998; Molho, 1995). This paper is focused on the unbalanced regional development and the test of the presence of spatial autocorrelation is not attempted here. It should be worthwhile to explore the extent of autocorrelation and its impact on the results in further research.

Finally, four regression equations were obtained for the year 1980, 1985, 1990 and 1995, respectively, as follows:

$$Y_{1980} = -0.0000147 + 0.225X_1 + 0.368X_2 + 0.479X_3 \quad (1)$$

(5.004) (6.819) (9.193)

$$R^2 = 0.882 \quad \text{Adjusted } R^2 = 0.878$$

$$Y_{1985} = -0.0000302 + 1.814X_1 + 0.215X_2 + 0.304X_3 - 1.397X_4 \quad (2)$$

(6.723) (2.574) (5.769) (6.668)

$$R^2 = 0.956 \quad \text{Adjusted } R^2 = 0.954$$

$$Y_{1990} = -0.0000012 + 0.360X_2 + 0.647X_3 \quad (3)$$

$$(8.437) \quad (15.179)$$

$$R^2 = 0.954 \quad \text{Adjusted } R^2 = 0.953$$

$$Y_{1995} = -0.000000087 + 0.289X_1 + 0.398X_2 + 0.338X_3 \quad (4)$$

$$(4.481) \quad (5.720) \quad (6.788)$$

$$R^2 = 0.907 \quad \text{Adjusted } R^2 = 0.904$$

Here, Y_{1980} , Y_{1985} , Y_{1990} , Y_{1995} are the development factors for 1980, 1985, 1990 and 1995, respectively. All the independent variables have been standardized with a zero mean and a standard deviation of one. Thus, the value of each regression parameter in the above equations represents the relative importance of the variable concerned. T-statistics for each independent variable are given in brackets.

Findings from the initial correlation confirm that PLR and PURS are important factors of regional development; they appear in all equations. PIF is also an important factor appearing in three equations, except for 1990. It is noted that PIF actually has among the four years the largest correlation coefficient with the development factor in 1990. The reason that it does not appear in the regression equation for 1990 may be that it has the largest correlation coefficients with PLR and PURS that are already in the regression model. Table 6 presents the correlation coefficients among all independent variables for the four years.

Regression equation (2) for year 1985 is peculiar. It seems to suffer from a multi-collinearity problem in so far as PIF and PFDI appear in the equation as the most significant factors with an opposite positive and negative impact. According to Table 6, they have a high correlation coefficient of 0.987 so that these two independent variables are almost identical.

It is interesting to note that PFDI does not appear in equations for the year 1980, 1990 and 1995. Previous analysis indicated that it had become more important in the 1990s; but its correlation

Table 6 Correlation Coefficients among Independent Variables, 1980-1995

Variables	PIF	PLR	PURS	PFDI
1980				
PIF	1.000	0.573	0.528	0.894
PLR	0.573	1.000	0.707	0.351
PURS	0.528	0.707	1.000	0.388
PFDI	0.894	0.351	0.388	1.000
1985				
PIF	1.000	0.957	0.789	0.987
PLR	0.957	1.000	0.811	0.925
PURS	0.789	0.811	1.000	0.706
PFDI	0.987	0.925	0.706	1.000
1990				
PIF	1.000	0.984	0.823	0.918
PLR	0.984	1.000	0.852	0.908
PURS	0.823	0.852	1.000	0.782
PFDI	0.918	0.908	0.782	1.000
1995				
PIF	1.000	0.864	0.712	0.740
PLR	0.864	1.000	0.759	0.722
PURS	0.712	0.759	1.000	0.737
PFDI	0.740	0.722	0.737	1.000

coefficient with the development factors is not as large as two other important factors, such as PLR and PURS. Generally, PFDI is also highly correlated with PIF in 1980 and with PLR and PURS in 1985, 1990 and 1995. This means that FDI reinforces other factors of regional development rather than acts as a separate force in the reconfiguration of Guangdong's spatial economy. This is consis-

tent with the diffusion of FDI within the Zhujiang Delta (Shen et al., forthcoming).

Overall, the development factors in years 1980, 1985, 1990 and 1995, could be well explained by two or three important variables related to capital investment, savings and the financial condition of the local government. Even when an independent variable, such as PIF and PFDI, does not appear in the regression model, it is simply because it has a high correlation with other variables. The relations of the independent variables with the development factor are stable, indicating that there have been no fundamental change in the key factors of regional development in Guangdong. There is a significant historical imprint on the unbalanced regional development in the province. Most poor areas remain poor and rich areas remain rich with only a few exceptions, such as the relative decline of Guangzhou and other administrative sub-centres at the periphery. Another exception is that some really fast growing areas, such as Shenzhen and Zhuhai, have become important growth centres of the province.

A top-down approach (development from above) had prevailed in Guangdong's regional development in the pre-reform period. The spatial economy had been characterized by a strong centre in Guangzhou and a few administrative centres relatively evenly distributed over the space. In the reform period, economic reforms, the open-door policy and FDI have generally favoured relatively developed areas, such as the Zhujiang Delta. FDI has an increasing impact on regional development (development from outside), but its effect is generally in the same direction as other factors. The role of local government in regional development has been strengthened rather than weakened in the era of decentralization with its bottom-up approach (development from below). Again, local government in well-developed areas is in a good position to play an active role due to its better financial resources, development experience and skilled officials. All these new and old forces of regional development work together to produce a post-reform spatial economy that bears some similarity with the pre-reform situation, yet shows also significant change.

6. Conclusion

Convergence and divergence of regional development is an important issue to central and local governments, planners and decision-makers. China's central planning system in the pre-reform period was widely believed to facilitate balanced regional development, although the actual outcome was questionable. Economic reforms and the market system introduced in China after 1978 are likely to produce unbalanced regional development, with a process of regional development much similar to that of Western capitalist countries. Once again, this common belief is being questioned as evidence of balanced regional development has been found. However, many studies about regional development in post-reform China focus on differential development among the three economic belts and provinces.

This paper has examined the spatial development at the county level within a province, Guangdong, which has been the testing ground of China's new reform and open-door policy. The result of this paper helps to understand the process of spatial polarization under the new socialist market in the province. The systematic analysis of the changing spatial economic structure in Guangdong province has used the multivariate analysis approach. It was found that, under the socialist-market system, a regional polarization process towards the core Zhujiang Delta has occurred along with a spatial restructuring process within the core region. The role of old central cities, such as Shaoguan, Zhanjiang and Shantou, outside the core region have been weakened gradually, while the emerging cities of Shenzhen, Zhuhai, Dongguan, Zhongshan, Shunde, Nanhai and Panyu in the core region have become new growth centres. The dominant role of Guangzhou, established in the pre-reform planning system, has also been significantly weakened in the post-reform period. In the Zhujiang Delta, there has been a trend towards even development as the development has been diffused to other areas of the delta region.

An exploratory analysis of the causes of the differential spatial development has also been carried out by regressing the development factor against a set of explanatory variables. It is found that the urban and rural savings per capita and local fiscal revenue per capita are the most important factors in determining the level of local development in Guangdong. This means that the development of a local economy depends very much on the wealth of the locality. This is not unexpected, as rich areas will have more capacity for further development in terms of both financial and human resources. Investment in fixed assets per capita also has a significant impact on the development factor in 1980, 1985 and 1995. It seems clear that the more developed areas in Guangdong, particularly in the Zhujiang Delta, have achieved sustained growth and development and that such development has been diffused gradually to other areas of the delta with little going to peripheral areas beyond the delta.

References

- Amin, A. 1999. "An Institutional Perspective on Regional Economic Development," *International Journal of Urban and Regional Research*, 23(2):365-78.
- Amin, A. and P. Cohendet. 1999. "Learning and Adaptation in Decentralized Business Networks," *Environment and Planning D: Society and Space*, 17:87-104.
- Amin, A. and N. Thrift. 1995. "Institutional Issues for the European Regions: From Markets and Plans to Socioeconomics and Powers of Association," *Economy and Society*, 24(1):41-66.
- Bluestone, B. 1988. "Deindustrialization and Unemployment in America," *Review of Black Political Economy*, 17(2):29-44.
- Bluestone, B. and B. Harrison. 1982. *The Deindustrialization of America*. New York: Basic Books.
- Bourne, L. S. 1980. "Alternative Perspectives on Urban Decline and Population Deconcentration," *Urban Geography*, 1:39-52.
- Cannon, T. and L. Y. Zhang. 1996. "Inter-region Tension and China's Reforms," in I. G. Cook, M. A. Doel and R. Li (eds), *Fragmented Asia: Regional Integration and National Disintegration in Pacific Asia*, pp. 75-101. Aldershot: Avebury.
- Chadwick, G. F. 1987. *Models of Urban and Regional Systems in Developing Countries: Some Theories and Their Application in Physical Planning*. Oxford: Pergamon Press.
- Chan, R. C. K., T. Hsueh and C. Luk (eds). 1996. *China's Regional Economic Development*. Hong Kong: Hong Kong Institute of Asia-Pacific Studies, The Chinese University of Hong Kong.
- Cheng, J. Y. S. (ed.). 1998. *China Review 1998*. Hong Kong: The Chinese University Press.
- Cheshire, P. 1990. "Explaining the Recent Performance of the European Community's Major Urban Regions," *Urban Studies*, 27:311-33.
- Cliff, A. D. and J. K. Ord. 1973. *Spatial Autocorrelation*. London: Pion.
- Cooke, P. and K. Morgan. 1998. *The Associational Economy: Firms, Regions, and Innovation*. Oxford: Oxford University Press.
- Dicken, P. 1992. "International Production in a Volatile Regulatory Environment: The Influence of National Regulatory Policies on the Spatial Strategies of Transnational Corporations," *Geoforum*, 23:303-16.
- Dunford, M. 1993. "Regional Disparities in the European Community: Evidence from the REGIO Databank," *Regional Studies*, 27(8):727-43.
- Erdeving, E. H. 1991. "An Overview of the Economy of the Great Lakes States," in W. A. Testa (ed.), *The Great Lakes Economy: Looking North and South*, pp. 21-27. Chicago: Federal Reserve Bank of Chicago.
- Fan, C. C. 1995a. "Spatial Impacts of China's Economic Reforms in Jiangsu and Guangdong Provinces," *Chinese Environment and Development*, 6:85-116.
- Fan, C. C. 1995b. "Of Belts and Ladders: State Policy and Uneven Regional Development in Post-Mao China," *Annals of the Association of American Geographers*, 85(3):421-49.

- Fan, C. C. 1996. "Economic Opportunities and Internal Migration: A Case Study of Guangdong Province, China," *Professional Geographer*, 48(1):28-45.
- Fan, C. C. 1997. "Uneven Development and Beyond: Regional Development Theory in Post-Mao China," *International Journal of Urban and Regional Research*, 21(4):620-39.
- Friedmann, J. 1969. *A General Theory of Polarized Development*. Los Angeles: University of California Press.
- Guangdong Statistical Bureau. 1981. *Statistical Yearbook of Guangdong 1981*. Beijing: China Statistical Publishing House.
- Guangdong Statistical Bureau. 1986. *Statistical Yearbook of Guangdong 1986*. Beijing: China Statistical Publishing House.
- Guangdong Statistical Bureau. 1991. *Statistical Yearbook of Guangdong 1991*. Beijing: China Statistical Publishing House.
- Guangdong Statistical Bureau. 1996. *Statistical Yearbook of Guangdong 1996*. Beijing: China Statistical Publishing House.
- Guangdong Statistical Bureau. 1999. *Statistical Yearbook of Guangdong 1999*. Beijing: China Statistical Publishing House.
- Hall, P. 1987. "The Anatomy of Job Creation: Nations, Regions and Cities in the 1960s and 1970s," *Regional Studies*, 21:95-106.
- Hall, P. 1988. "The Geography of the Fifth Kondratieff," in D. Massey and J. Allen (eds), *Uneven Re-development: Cities and Regions in Transition — A Reader*, pp. 51-67. London: Hodder and Stoughton in association with the Open University.
- Han, S. S. and C. W. Pannell. 1999. "The Geography of Privatization in China, 1978-1996," *Economic Geography*, 75(3):272-96.
- Harrison, B. 1987. "The Impact of Corporate Restructuring on Labor Income," *Social Policy*, 18(2):6-10.
- Hepple, L. W. 1998. "Exact Testing for Spatial Autocorrelation among Regression Residuals," *Environment and Planning A*, 30(1):85-108.
- Kutscher, R. E. and V. A. Personick. 1986. "Deindustrialization and the Shift to Services," *Monthly Labor Review*, 109(6):3-13.
- Leung, C. K. 1996. "Foreign Manufacturing Investment and Regional Industrial Growth in Guangdong Province, China," *Environment and Planning A*, 28(3):513-36.

- Lin, G. C. S. 1997. *Red Capitalism in South China: Growth and Development of the Pearl River Delta*. Vancouver: UBC Press.
- Lin, G. C. S. 1999. "State Policy and Spatial Restructuring in Post-reform China, 1978-95," *International Journal of Urban and Regional Research*, 23(4):670-96.
- Lin, G. C. S. 2000. "State, Capital and Space in China in an Age of Volatile Globalization," *Environment and Planning A*, 32:455-71.
- Mingione, E. 1981. *Social Conflict and the City*. Oxford: Blackwell.
- Molho, I. 1995. "Spatial Autocorrelation in British Unemployment," *Journal of Regional Science*, 35:641-58.
- Ng, M. K. 1994. "Cumulative Experiences of Growth and Development in Selected Asian Countries: A Research Agenda for Regional Development Planning in Hong Kong-Southern China." Paper presented at the CUPEM Research Seminar Series, University of Hong Kong, Hong Kong, 18 March.
- Oi, J. 1995. "The Role of the Local State in China's Transitional Economy," *The China Quarterly*, 144:1132-49.
- Oi, J. 1999. *Rural China Takes Off: Institutional Foundations of Economic Reform*. Berkeley: University of California Press.
- Ouyang, N. 1993. "Economic Restructuring and Regional Disparities in Guangdong Province," *Acta Geographica Sinica*, 48(3):204-17.
- Pannell, C. W. 1988. "Regional Shifts in China's Industrial Output," *Professional Geographer*, 40(1):19-32.
- Parsonage, J. 1992. "Southeast Asia's 'Growth Triangle': An Extended Metropolitan Region? Problems and Prospectus." Paper presented at the International Conference on Managing the Mega-Urban Regions of ASEAN Countries: Policy Challenges and Responses, Asian Institute of Technology, Bangkok, 30 November-3 December.
- Peet, R. 1983. "Relations of Production and Relocation of United States Manufacturing Industry Since 1960," *Economic Geography*, 59:105-11.
- Rostow, W. W. 1960. *The Stages of Economic Growth: A Non-Communist Manifesto*. Cambridge: Cambridge University Press.

- Sassen, S. 1996. *Losing Control?: Sovereignty in an Age of Globalization*. New York: Columbia University Press.
- Shen, J. 1999a. *Urbanization and Population Management*. Beijing: Sciences Press.
- Shen, J. 1999b. "Urbanization in Southern China: The Rise of Shenzhen City," in A. G. Aguilar and I. Escamilla (eds), *Problems of Megacities: Social Inequalities, Environmental Risks and Urban Governance*, pp. 635-48. Mexico City: Universidad Nacional Autonoma de Mexico.
- Shen, J., D. K. Y. Chu and K. Y. Wong. 1998. "Modelling Unbalanced Regional Growth in Zhujiang Delta," in *Proceedings of International Conference on Modelling Geographical and Environmental Systems with Geographical Information Systems*, Vol. 2, pp. 509-14. Hong Kong: Department of Geography and Centre for Environmental Studies, The Chinese University of Hong Kong, International Geographic Union-Commission on Modelling Geographical Systems.
- Shen, J., D. K. Y. Chu and K. Y. Wong. 1999. "The Shenzhen Model: Forces of Development and Future Direction of a Mainland City Near Hong Kong," in S. Ye, Y. Niu and C. Gu (eds), *Studies on the Regional Integration under the Model of "One Country Two Systems"*, pp. 112-31. Beijing: Sciences Press.
- Shen, J., K. Y. Wong, K. Y. Chu and Z. Feng. Forthcoming. "The Spatial Dynamics of Foreign Investment in the Pearl River Delta, South China," *The Geographical Journal*.
- Sit, V. F. S. 1998. "Hong Kong's 'Transferred' Industrialization and Industrial Geography," *Asian Survey*, 38(9):880-904.
- Sit, V. F. S. and C. Yang. 1997. "Foreign-investment-induced Exo-urbanisation in the Pearl River Delta, China," *Urban Studies*, 34(4):647-77.
- Skocpol, T. 1985. "Bringing the State Back In: Strategies of Analysis in Current Research," in P. B. Evans, D. Rueschemeyer and T. Skocpol (eds), *Bringing the State Back In*, pp. 1-37. Cambridge: Cambridge University Press.
- Slater, D. 1982. "State and Territory in Post Revolutionary Cuba: Some Critical Reflections on the Development of Spatial

- Policy," *International Journal of Urban and Regional Research*, 6(1):1-34.
- Soulard, F. 1997. *The Restructuring of Hong Kong Industries and the Urbanization of Zhujiang Delta, 1979-1989*. Hong Kong: The Chinese University Press.
- State Statistical Bureau (SSB). 1998. *Statistical Yearbook of China 1998*. Beijing: China Statistical Publishing House.
- Storper, M. 1997. *The Regional World: Territorial Development in a Global Economy*. New York: Guilford Press.
- Susman, P. 1987. "Spatial Equality and Socialist Transformation in Cuba," in D. K. Forbes and N. Thrift (eds), *The Socialist Third World*, pp. 250-81. Oxford: Basil Blackwell.
- Townroe, P. M. and D. Keen. 1984. "Polarization Reversal in the State of Sao Paulo, Brazil," *Regional Studies*, 18(1):45-54.
- Walder, A. G. 1994. "The Decline of Communist Power: Elements of a Theory of Institutional Change," *Theory and Society*, 23:297-323.
- Walder, A. G. 1998. "The County Government as an Industrial Corporation," in A. G. Walder (ed.), *Zouping in Transition: The Process of Reform in Rural North China*, pp. 62-85. Cambridge, MA: Harvard University Press.
- Wei, Y. H. 1996. "Fiscal Systems and Uneven Regional Development in China, 1978-1991," *Geoforum*, 27(3):329-44.
- Wei, Y. H. 1998. "Economic Reforms and Regional Development in Coastal China," *Journal of Contemporary Asia*, 28(4):498-517.
- Wei, Y. H. and Laurence J. C. Ma. 1996. "Changing Patterns of Spatial Inequality in China, 1952-1990," *Third World Planning Review*, 18(2):171-91.
- Weng, Q. H. 1998. "Local Impacts of the Post-Mao Development Strategy: The Case of the Zhujiang Delta, Southern China," *International Journal of Urban and Regional Research*, 22(3):425-42.
- Wu, C. T. 1987. "Chinese Socialism and Uneven Development," in D. K. Forbes and N. Thrift (eds), *The Socialist Third World*, pp. 53-97. Oxford: Basil Blackwell.

- Xu, X. and S. Li. 1995. "A Research on Temporal Disparities of Foreign Investment in Guangdong since China's Reform and Open-door," *Acta Geographica Sinica*, 50(2):128-37.
- Yeung, H. W. 1998. "Capital, State and Space: Contesting the Borderless World," *Transactions of the Institute of British Geographers*, 23:291-310.
- Yeung, Y. M. 1998a. "Globalization and Southeast Asian Urbanism." Hong Kong: Occasional Paper No. 143, Department of Geography, The Chinese University of Hong Kong.
- Yeung, Y. M. (ed.). 1998b. *Urban Development in Asia: Retrospect and Prospect*. Hong Kong: Hong Kong Institute of Asia-Pacific Studies, The Chinese University of Hong Kong.
- Yeung, Y. M. 1999. "The Emergence of Pearl River Delta's Mega Urban-region in a Globalizing Environment." Hong Kong: Occasional Paper No. 90, Hong Kong Institute of Asia-Pacific Studies, The Chinese University of Hong Kong.
- Yeung, Y. M. and D. K. Y. Chu (eds). 1998. *Guangdong: Survey of a Province Undergoing Rapid Change*. Hong Kong: The Chinese University Press.
- Yeung, Y. M., D. Lu and J. Shen (eds). 1999. *Towards the 21st Century in China: Urban and Regional Development*. Hong Kong: Hong Kong Institute of Asia-Pacific Studies, The Chinese University of Hong Kong.
- Ying, L. G. 1999. "China's Changing Regional Disparities during the Reform Period," *Economic Geography*, 75(1):59-70.
- Zhao, S. X. 1996. "Spatial Disparities and Economic Development in China, 1953-92: A Comparative Study," *Development and Change*, 27:131-63.
- Zheng, K., Q. Li and S. Qi. 1996. "The Core and Periphery Analysis of China's Regional Economics," in R. C. K. Chan, T. Hsueh and C. Luk (eds), *China's Regional Economic Development*, pp. 205-28. Hong Kong: Hong Kong Institute of Asia-Pacific Studies, The Chinese University of Hong Kong.

Regional Polarization in Guangdong Province in South China

Abstract

This paper examines the trends of regional development under the new regime of socialist-market system in Guangdong province in south China in the post-reform period. It is found that a regional polarization process towards the core Zhujiang Delta region has occurred along with a spatial restructuring process within the core region. The role of old central cities, such as Shaoguan, Zhanjiang and Shantou outside the core region, has been weakened gradually while the role of some emerging cities, such as Shenzhen, Zhuhai, Zhongshan, Shunde, Nanhai and Panyu in the core region, has led them to become new growth centres. The dominant role of Guangzhou, established under the pre-reform planning system, has also been significantly weakened in the post-reform period. Among the forces of development having influence from above, from below or from outside, local government revenue and savings per capita are found to be the key factors of the development level in various localities, confirming the importance of the local government as a major actor in regional development in China.

華南廣東的區域極化

沈建法

顧朝林

甄峰

黃鈞堯

（中文摘要）

本文探討改革開放以來位於華南的廣東省在新的社會主義市場體制下的區域發展。本文發現廣東出現了向核心的珠江三角洲地區集中的區域極化過程。珠江三角洲內部則經歷了空間結構調整過程。核心區以外舊的中心城市如韶關、湛江和汕頭的作用逐漸削弱。核心區內的新興城市如深圳、珠海、中山、順德、南海和番禺等正發展成為新的區域增長中心。廣州在改革之前計劃體制下建立的支配地位在改革開放時期也大大減弱。在自上而下、自下而上和外部推動各種發展因素中，本文發現地方政府財政收入和人均儲蓄額是決定各地發展水平的關鍵因素，證實了地方政府在中國區域發展中的重要作用。