Local Impacts of the Post-Mao Development Strategy: The Case of the Zhujiang Delta, Southern China*

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Introduction

The post-Mao development strategy, beginning in 1978, contains two components: (1) economic reform; and (2) the open door policy. Economic reform started in rural China. Its final goal is to reshape the Chinese economy from one that is guided by administrative authorities to one that is market-oriented. The open door policy, on the other hand, aims to attract foreign investment, advanced technology and management skills to the coastal cities and areas. This strategy has had a great influence on China's economic development, economic structure and the spatial distribution of economic activities generally at the national level, and particularly at the local level. Under it, the Zhujiang Delta in Guangdong province, southern China (Figure 1), has become one of the most advanced economic areas in the nation, and therefore is regarded as one of the greatest beneficiaries. Especially when one considers the fact that the Chinese government has set it up as a development model of 'socialism with Chinese characteristics' (Su, 1985), the delta is clearly an appropriate place to study the local impacts of the development strategy.

Geographically, the Zhujiang Delta, consisting of three sub-deltas — Xijiang, Beijiang and Dongjiang — is the third largest delta in China, with an area of 17,200 square kilometers. In this article, the Zhujiang Delta refers to the Zhujiang Delta Economic Open Zone (EOZ). It is much larger than the geomorphic delta, having an area of 25,275 square kilometers and a population of 14.058 million. Currently the EOZ is composed of 12 cities: Guangzhou, Foshan, Jiangmen, Zhongshan, Dongguan, Shenzhen, Zhuhai, Nanhai, Panyu, Shunde, Xinhui and Taishan; and 8 counties: Kaiping, Enping, Gaoming, Heshan, Zengcheng, Sansui, Doumen and Baoan.

In focusing on the spatial patterns of the gross value of industrial and agricultural output (GVIAO), this article has four major objectives: (1) to document the economic growth and macroeconomic performance in the delta during the period from 1978 to 1992; (2) to analyze the consequences of such growth on the spatial economic patterns; (3) to analyze the impacts on spatial relationship between the industrial and agricultural sectors; and (4) to examine the change in regional disparity due to the growth.

* I would like to thank the anonymous main referee for his/her constructive suggestions, and Drs C.P. Lo and James O. Wheeler for their comments on earlier versions of this paper.

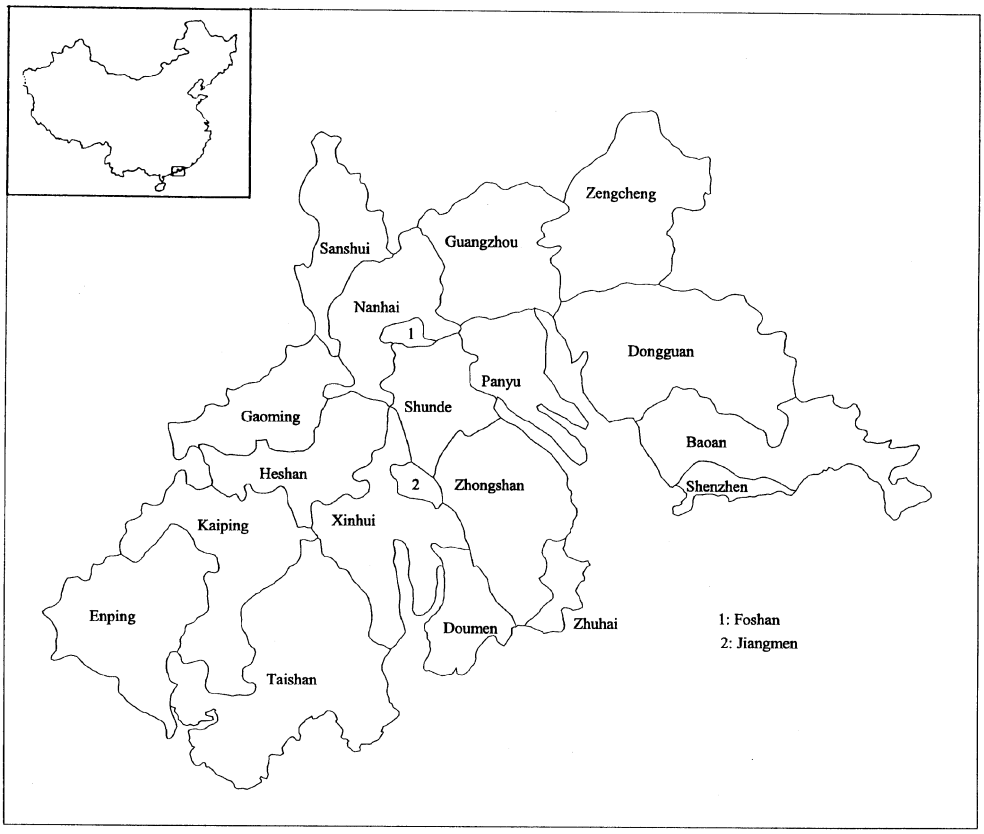

Figure 1 *Study area: Zhujiang Delta, Guangdong province, southern China*

Spatial dimension of the post-Mao development strategy

Spatial policies

The post-Mao development strategy resulted from the negation of Maoist development strategy, and represents new Chinese leaders' efforts to revitalize the stagnating economy of China. The Maoist strategy set spatial policy objectives as: (1) regional equity; and (2) national defense (Wei and Ma, 1994; Fan, 1995). It constantly adjusted regional priorities in different sub-periods according to changes in the general national and international socio-political environment (Zhou, 1993). Economic efficiency was ignored, and foreign investment and international interaction were discouraged. Consequently, in time, the Chinese economy approached the verge of collapse. The strategy since 1978, therefore, represents the Chinese government's effort to reverse this situation.

Early in the sixth Five-year Plan (1981–85), a 'ladder-step' doctrine was ambiguously put forward (State Council, 1982). According to Yang (1990), this doctrine divided China into three economic belts: eastern, central and western, akin to three steps on a ladder, based on their socio-economic, historical and locational conditions. The most advanced eastern region, on the highest step, was to be developed first to form a processing center for inland raw materials and China's export base, and to absorb the imported advanced technology and develop indigenous capabilities for technical and economic innovations. The central and western regions were to develop only after the

eastern region was sufficiently developed and able to diffuse its technology, capital and management skills to the interior. Clearly, the goal of this doctrine was to maximize national economic efficiency. Based on the 'ladder-step' doctrine, four Special Economic Zones (SEZs), fourteen open cities and three EOZs were successively established along the coast in the eastern region during this period.

In 1983, another significant spatial development measure appeared, known as 'city guiding county' (*shi dai xian*) (Zhongguo Baike Nianjian Bianjibu, 1984). Counties, which were in the Maoist era basic local administrative units responsible for economic, social and political affairs, had been under the jurisdiction of political units called *prefectures*. Modern Chinese reformers believed that prefectures had no potential for contributing to economic reform, and therefore should be abolished. Accordingly, administrative power over the counties was transferred to nearby cities and limited to economic 'guidance'. Most importantly, this measure stressed that the advanced technology, capital, management skills and manufacturing of a central city should diffuse to surrounding counties.

In April 1986, when the seventh Five-year Plan (1986–90) was announced, the three-economic-belt model, which the ladder-step doctrine underlies, was explicitly expressed (State Council, 1986). The Plan stated that the eastern region should strengthen the technological transformation of traditional industries and develop knowledge- and technology-intensive and high value-added consumer products industries; the central region should concentrate on producing energy and raw materials, certain machinery and electrical products, and agricultural products; and the western region should emphasize agriculture, forestry, animal husbandry and transportation, and selectively develop its energy and mineral resources and certain local processing industries (State Council, 1986). No doubt, the eastern region was selected as the 'engine of growth' for Chinese economic development.

The post-Mao development strategy also recognizes the importance of a well-established system of cities and towns in spatial development, in diffusing benefits from the core to the periphery and in reducing the differences between urban and rural areas. Thus, a small town strategy or 'non-metropolitan strategy' (Kirby, 1989: 352) or 'rural-urbanization' strategy (Chang and Kwok, 1990: 140) for urbanization is advocated, in which the size of larger cities is controlled, medium-sized cities are allowed to develop reasonably and small cities and towns are actively promoted. Emphasis on small cities and towns is also seen as crucial in absorbing the surplus labor force which is released from the agricultural sector as a consequence of improved agricultural efficiency and productivity.

Furthermore, the small towns strategy is connected to the agricultural reform policies of rural China — the rural projects. The major goal of rural projects is to revitalize the rural economy by transforming local institutions of agricultural production systems by diversifying rural economic activities and creating employment opportunities in secondary and tertiary production; by improving agricultural production efficiency; and by maximizing the utilization of natural and human resources. The prospering of the Chinese rural economy after 1978, particularly in village-township enterprises and market-oriented commercial production, demonstrates that the small towns strategy is an efficient solution for reducing the industrial-agricultural differences, particularly worker-peasant income differences. Moreover, the urban-rural gap has been reduced in a few favorable areas (Chang and Kwok, 1990).

Finally, the post-Mao reformers recognize the existence of a regional division of labor. They emphasize that each region has a special role and should do what it is most able to do, 'taking account of each region's factor endowments — or comparative advantage' (Yang, 1990: 241). The core concept here is comparative advantage. The Chinese government has used this concept to explain the rationale for regional inequality, and it underpins the 'ladder-step' doctrine (Yang, 1990).

Theoretical implications

Much effort has been expended to explain the Chinese spatial policies from the viewpoint of western theories of regional development. However, these theories cannot fully account for the mechanisms of the regional development process in China. Nor can they explain the complicated experience of regional disparities under the new development strategy (Fan, 1995). As discussed above, the 'ladder-step' doctrine, as the blueprint of post-Mao spatial development, results from particular Chinese physical, historical and socio-economic conditions. Meanwhile, because China is a socialist country, state policy plays a critical role in determining regional priorities. Western theories of regional development, primarily derived from western capitalist countries, are not applicable to China due to their assumption of a high mobility factor and a disregard for the role of the state (Fan, 1995). This leads to a new argument that the Chinese spatial development should be interpreted in the context of its own political economy, and a new theory of regional development should be established based on China's experience.

Nevertheless, fundamental differences of opinion about this applicability persist among the writers of Chinese spatial policy. The studies by Phillips and Yeh (1989) and by Lo (1989) claim that the Chinese government takes a growth pole approach as a guide in its economic development. Yang (1990) asserts that the 'ladder-step' doctrine is similar to the liberal argument of diffusion effects from the core to the periphery. Chinese journals, according to Fan (1995), suggest that growth pole theory has emerged as an alternative to the 'ladder-step' doctrine.

Growth pole theory, as studied by many theorists (Perroux, 1955; Hansen, 1967; Darwent, 1969; Lasuen, 1969; Nichols, 1969; Hermansen, 1972; Higgins, 1978), argues that a core relates and interacts with its periphery by diffusion effects and polarization effects. According to Myrdal (1957) and Hirschman (1958), there are two types of transmission effects from a core to its periphery: favorable effects and unfavorable effects. The former mainly refer to the flow of investment and the diffusion of innovation from the core to the periphery and the purchase of products from the periphery; the latter refer to the flow of skilled people and capital away from the periphery. From Perroux's ideas, many writers believe that free market forces will automatically balance these two effects, and lead to diffusion effects to the periphery (Myrdal, 1957; Darwent, 1969; Friedmann, 1972). Furthermore, Richardson (1979) claims that three different curves for the time paths of the diffusion, polarization and net spillover effects should be distinguished. He suggests that the time path of diffusion effects can be divided into at least three phases, that is, 'a slow start; a 'bandwagon' effect (gathering momentum); and a slowing-down process associated with saturation' (p. 169). The polarization effects are generally high in the initial phase as a result of the gravitation of resources, especially of labor, toward the core; they then reach a maximum due to the economies of agglomeration and urbanization; their eventual weakening is primarily ascribed to the relocation of industries, skilled people and funds from the core to the periphery. The time path of the net spillover effects depends 'not only on the general shapes of the other two functions but on their relative slopes at different periods of time' (Richardson, 1979: 170).

Growth pole theory also concerns the relationship between the generation of diffusion effects and city size or distribution of city sizes. As an urban- and industrial-based theory, derived from the experience of western European countries, it emphasizes that a well established urban system will be conducive to diffusion effects (Richardson, 1979; Rondinelli, 1985). Only through this system can the movements of goods and services, capital and technology be diffused from the core to the periphery. Moreover, many writers advocate the development of medium-sized cities (Johnson, 1970; Richardson and Townroe, 1986). Medium-sized cities between large industrial and small rural centers could take on an important role in decentralizing production and population so as to reduce regional disparities, in improving administrative efficiency, and in serving as a *funnel* through which technology is diffused. Furthermore, town-centering or agropolitan

development policy has been advocated by many writers (Friedmann and Douglass, 1978; Lo and Salih, 1978; 1981; Stohr, 1981). These writers argue that investment, technology, goods and services should disperse directly to rural areas and small towns in order to promote regional equity and efficiency. Hence, small towns should be encouraged to facilitate more effective urban-rural interaction.

The post-Mao development strategy reflects the influence of growth pole theory. By designing SEZs, open cities and EOZs in the coastal region as regional cores, it aims at maximizing national economic efficiency. Furthermore, this spatial development approach has been associated with the small towns urbanization strategy and with the rural projects. Whether the strategy can finally succeed remains an open question, but the small towns strategy apparently coincides with an approach which Friedmann and Douglass (1978) and Lo and Salih (1978) strongly recommend as a supplementary strategy to the growth pole development within the Asian context. In addition, the 'city guiding county' model embraces the concepts of diffusion.

Rapid economic growth since 1978 indicates that Chinese new spatial policies have been successful to a certain degree, especially when one considers that the industrial-agricultural gap as well as the urban-rural gap in some favorable areas has been effectively reduced (Chang and Kwok, 1990). However, as development proceeds under the new development strategy, several practical and political difficulties arise. In the first instance, the diffusion effects of economic benefits are far less than expected from the coastal to the central and western regions, and from the cores to the peripheries. This problem cannot be attributed to any one factor. Market forces, government intervention, spatial structure factors, and the time path of net spillover effects can all be part of the problem. The spatial dimension of the post-Mao development strategy, as a response to the failure of Maoist development strategy, has focused on the national interest rather than on regional equity. In the second instance, political pressures have risen from conflict between the coastal region and the central and western regions (Yang, 1990). The post-Mao strategy clearly states preferential treatment for the coastal region, especially SEZs, the open cities and EOZs, and implies exclusion of all other regions. Economic reform, supposedly aspatial, does nevertheless favor areas with a greater market potential (Phillips and Yeh, 1989). Inevitably, regional conflict occurs on many fronts. Finally, a surge of migration from the interior regions to the coastal cities has emerged as a response to the widening gap between the coastal and central and western regions.

How successful China has been in achieving these spatial policy objectives is best studied with reference to the Zhujiang Delta, which is considered to be one of the greatest beneficiaries of the post-Mao development strategy.

Economic growth

The overall economic growth performance in the Zhujiang Delta from 1978 to 1992 has been extremely strong, as indicated in Table 1. The gross output of industrial and agricultural production has increased extraordinarily from 140.44 hundred million yuan in 1978 to 2475.33 hundred million yuan in 1992. The average rate of annual growth of the GVIAO was 22.75%, in contrast with 21.19% in the entire Guangdong Province and 16.21% in the whole country. Because the population grew at a lower rate, about 1.67% per year, in the same period the per capita GVIAO increased rapidly too. Indeed, between 1978 and 1992, the delta emerged as one of the most advanced areas in China, with an average annual growth of 20.73% in per capita GVIAO. Evidence suggests that by 1990, the delta had met a major national development objective set for the year 2000, which is to quadruple the value of the gross national product by 1980 (*fan liang fan*). However, the overall figures may conceal some problems. In order to clarify the development process further, it is necessary to examine these figures by periods.

Table 1 *Macroeconomic performance of the Zhujiang Delta, 1978–92*

Item (Unit)					Annual growth rate (%)		
	1978	1984	1987	1992	1978–84	1984–87	1987–92
Gross output of industry (hundred million yuan)	107.89	238.68	694.80	2287.71	14.15	42.78	26.91
Village-township enterprises (hundred million yuan)	12.98	60.32	63.66	883.55	29.18	1.81	69.23
Gross output of agriculture (hundred million yuan)	32.55	62.86	49.06	187.62	11.59	−7.93	30.77
Cultivated land (ten thousand mu)	996.77	932.63	—	819.95	−1.10	—	—
Major farm products (ten thousand ton):							
Grain	372.88	441.47	424.54	327.87	2.85	−1.30	−2.56
Sugar cane	442.67	692.18	596.75	693.54	7.73	−4.82	3.05
Pigs	313.03	346.74	368.86	417.08	1.72	2.08	2.49
Aquatic products	21.47	37.07	54.97	60.17	9.53	14.03	1.82
Foreign trade (hundred million yuan)	14.78	29.78	73.54	142.08	12.39	35.17	14.08
Total commercial retailing value (hundred million yuan)	39.67	134.99	238.41	591.71	22.64	20.88	19.94
People's total savings at year-end (hundred million yuan)	9.93	69.85	150.54	991.02	38.42	29.17	45.78
Capital construction investment (hundred million yuan)	8.35	49.53	70.60	200.21	34.54	12.54	23.18

Sources: Zhujiang River Delta Economic Open Zone Committee (1986); Guangdong Province Statistical Bureau (1988; 1993).

The post-Mao development strategy was adopted in 1978, and the period from 1978 to 1984 was the foundation in the economic development of the delta. During this period, both the industrial and agricultural output rose slowly, as shown in Table 1. The reason for this slow growth is threefold. First, the economic base was weak in all sectors, particularly in industry, as a result of 29 years of Maoist development strategy. Secondly, all new policies and measures were on trial. Finally, only a small area, i.e. Shenzhen and Zhuhai, had been granted several preferential policies. Although these two cities grew at an average annual rate of 92.59% and 26.43% in GVIAO respectively, they were unable to make a shift in the economic growth performance for the entire region. Spatially, Guangzhou City was the only economic center, having almost half of the total GVIAO. A notable advance in this period, however, was that village-township enterprises rose sharply at an average annual rate of 29.18%. These enterprises were mainly involved in processing materials and intermediate products supplied by Hong Kong, Macao and foreign countries, and were essentially of a less-skilled and labor-intensive type. In most cases, they were just part of a foreign industrial production system. In contrast, market-oriented commercial agriculture was still at an initial stage.

The foundation period was followed by a transition period, 1985–86. In April 1984, Guangzhou was designated as an open city, and a few months later, in early 1985, the entire delta became an EOZ. Therefore, all cities and counties gained a series of privileges similar to those from which Shenzhen and Zhuhai had benefited since 1979, and rapid economic development for the whole region became possible. Table 2 indicates that the pace of industrial and agricultural expansion in most of the cities and counties from 1984 to 1987 was great, especially in Shenzhen, Zhuhai, Dongguan, Xinhui and Gaoming. By 1987, the GVIAO was approximately 1.88 times the 1984 level. This figure, however, says nothing about the marked imbalance between the agricultural and industrial sectors. Because of a drastic increase in simple processing industries (*san lai yi bu*) and the rise of joint ventures, cooperative and foreign-owned enterprises, the average

Table 2 *Average annual growth rate of the GVIAO by city/county, 1978–92*

City/County	1978–84	1984–87	1987–92
Guangzhou	10.19	13.98	24.78
Zengcheng	10.03	18.06	42.69
Panyu	11.41	25.24	41.51
Shenzhen	92.59	48.42	45.71
Baoan	23.48	27.53	47.91
Zhuhai	26.43	35.57	64.03
Doumen	12.06	18.64	43.19
Dongguan	11.44	36.78	35.84
Zhongshan	15.96	25.61	31.16
Jiangmen	11.85	16.84	31.61
Xinhui	14.65	30.01	28.80
Taishan	14.94	24.22	30.23
Kaiping	10.88	28.06	35.08
Enping	11.69	25.21	35.41
Heshan	11.38	29.94	45.26
Foshan	20.86	19.38	36.07
Nanhai	17.10	25.16	33.88
Shunde	14.66	24.87	35.90
Gaoming	9.48	32.39	47.19
Sanshui	13.28	26.07	35.91

Sources: Zhujiang River Delta Economic Open Zone Committee (1986); Guangdong Province Statistical Bureau (1988; 1993).

annual growth rate of industrial production between 1984 and 1987 reached 42.78%, the fastest growth rate in China's history. These three types of enterprise all depend on foreign capital and machinery, but to a different degree. The joint ventures are a cooperation of foreign investment with Chinese land and labor, whereas the cooperative enterprises further absorb a portion of Chinese money. The foreign-owned enterprises are highly independent, in which investors simply lease land and hire their own people. These enterprises are not constrained to urban areas, and thus contribute to the diffusion of modern technology, manufacturing, and management skills to small towns and rural communities. By contrast, agricultural production fell from 62.86 hundred million yuan in 1984 to 49.06 hundred million yuan in 1987, with an annual decrease rate of 7.93%. In particular, grain production, due to its lower market and commodity value, showed an annual decline of 1.30%. The main reasons for this decline were neglect of agricultural production by local governments and a growing number of farmers abandoning agricultural production and shifting to more profitable commercial activities and village-township enterprises.

From 1987 to 1992, the delta entered a new stage. First, the successful economic growth created a broadened capability in both the industrial and agricultural sectors. Second, joint ventures, cooperative and foreign-owned enterprises replaced the simple processing industries and acquired a critical role in generating foreign currency income. Third, the agricultural sector was 'refocused' and developed in tandem with the industrial sector. Fourth, tertiary production, such as transportation, commerce, banking, restaurants and tourism, became a vital part of the regional economy. By 1992, it was accounting for over one-third of gross output in terms of domestic production. Finally, Guangzhou was no longer the only economic center. Shenzhen, in combination with Zhuhai, accounted for 18.16% of the GVIAO, and became more and more prominent in shaping the delta's spatial economic structure and process. During this period, the output in both the industrial and agricultural sectors rose strongly, 26.91% per year in industry and 30.77% in agriculture. Major industrial products, such as household appliances, electronics, medicines and toys had become more distinctive for their quantity and design. Agricultural products, particularly seafood, poultry, vegetables and fruit, increasingly filled Hong Kong's and Macao's markets. By 1992, the GVIAO reached 4.37 times the 1987 level.

Changing spatial economic patterns

The spatial impact of the economic growth is uneven in the delta. The pattern of spatial concentration of economic activities has been greatly changed from 1978 to 1992, as indicated by the distribution quotient for each city/county, which is defined by Rondinelli (1985) as follows:

$$D.Q. = Y / X$$

where Y is the percentage of GVIAO, and X is the percentage of land area in each county/city. The result is displayed in Table 3 and mapped in Figures 2 and 3.

In 1978, when China initiated the new development strategy, there apparently was a core area in the delta, composed of Guangzhou (D.Q. = 8.89), Foshan (D.Q. = 15.40), Jiangmen (D.Q. = 7.71) and Shunde (D.Q. = 1.91) (Figure 2). With 9.52% of the area and 33.01% of the population, this area contained a total of 64.29% of the GVIAO. Remarkably, Guangzhou city accounted for approximately one half of the total GVIAO. By contrast, surrounding counties and cities such as Zengcheng, Baoan, Dongguan, Xinhui, Taishan, Kaiping, Enping, Heshan, Gaoming, Pangyu, Doumen, Zhongshan, Nanhai and Shansui lagged far behind the average developmental level, as evidenced by the distribution quotients in Table 3. An extensive backward area is visible in the western

Table 3 *Distribution quotients of the gross value of industrial and agricultural output in the Zhujiang Delta, 1978–92*

City/County	1978	1984	1987	1992
Guangzhou	8.89	7.40	5.95	4.12
Zengcheng	0.20	0.16	0.15	0.20
Panyu	0.65	0.58	0.61	0.80
Shenzhen	0.16	3.90	6.93	10.41
Baoan	0.15	0.25	0.28	0.45
Zhuhai	0.15	0.52	0.71	1.92
Doumen	0.31	0.29	0.26	0.36
Dongguan	0.55	0.49	0.68	0.72
Zhongshan	0.84	0.95	1.02	0.92
Jiangmen	7.71	7.03	6.09	5.50
Xinhui	0.50	0.53	0.63	0.51
Taishan	0.19	0.21	0.21	0.18
Kaiping	0.34	0.29	0.34	0.34
Enping	0.16	0.15	0.16	0.17
Heshan	0.21	0.19	0.23	0.33
Foshan	15.40	22.34	20.64	22.02
Nanhai	1.14	1.37	1.45	1.43
Shunde	1.91	2.02	2.14	2.27
Gaoming	0.15	0.12	0.15	0.24
Sanshui	0.44	0.43	0.47	0.50

Sources: Zhujiang River Delta Economic Open Zone Committee (1986); Guangdong Province Statistical Bureau (1988; 1993).

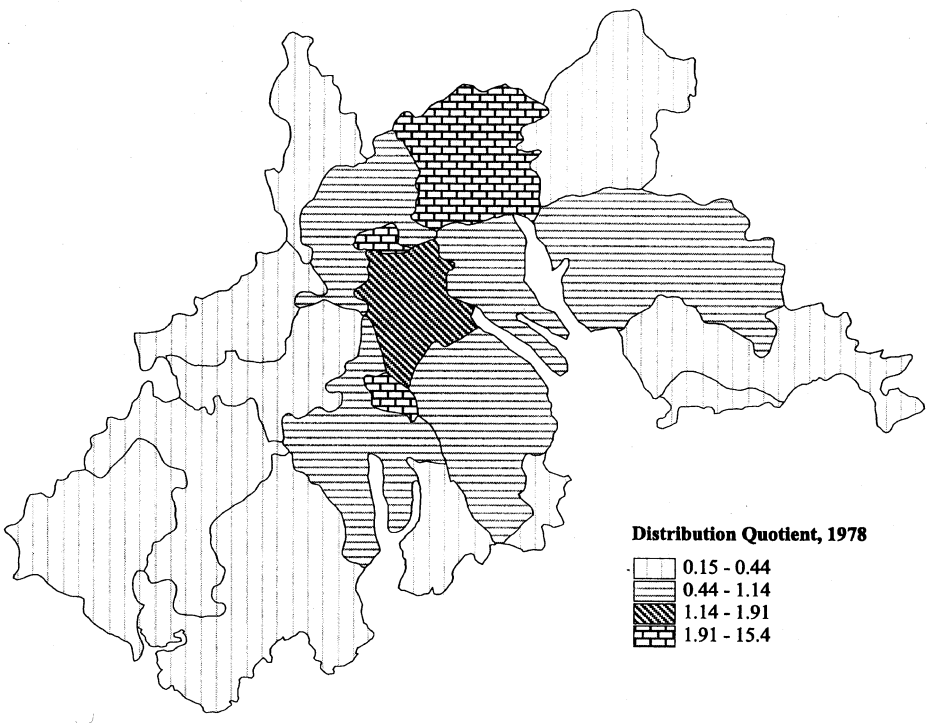

Figure 2 *Spatial economic pattern in Zhujiang Delta, 1978*

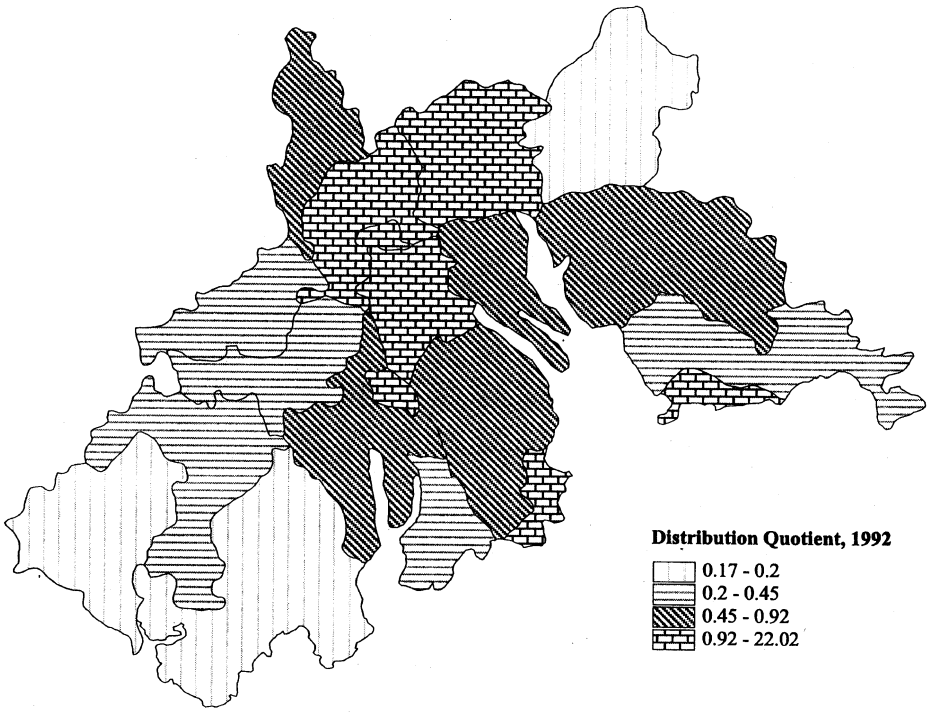

Figure 3 *Spatial economic pattern in Zhujiang Delta, 1992*

part of the delta, extending from Enping, Taishan and Doumen in the south, to Kaiping, Xinhui and Heshan in the center, and to Gaoming and Sanshui in the north (Figure 2).

To a great extent, this spatial pattern of distribution quotient is a result of the Maoist development strategy. During the 1950s, the Chinese government faced a dilemma between economic development and lack of funds. A limited amount of resources had to be concentrated in the coastal region and in some of the old cities of the Northeast for the purpose of fully utilizing industries there. From the 1960s to the early 1970s, the objective of national defense, which was influenced by international anti-communism, interacted with the balanced development policy to create the Third Front campaign, out of which policy came a period of burgeoning local industries and outlying towns in the central and western regions. Because Guangdong province was considered vulnerable to foreign military attack, it received a very small share of the national capital construction investment before 1978 (Yang, 1990; Zhou, 1993). Guangzhou city, however, with its superior location and long history of foreign trade, was developed as the capital of Guangdong province and as a national base for light and textile industries. This treatment yielded an average annual growth rate of 9.10% in comparison to 7.44% for the province as a whole. This would explain the monopolistic role of Guangzhou city in the delta before 1978.

A similar spatial economic pattern existed in 1984, the year before the entire delta was designated as an EOZ. While the distribution quotients of most cities and counties remained in the same category, there was a striking rise for Shenzhen and Zhuhai cities. This selective increase was undoubtedly caused by the open door policy, which designated Shenzhen and Zhuhai as SEZs in 1979, after Deng Xiaoping took over the Chinese leadership. However, these two cities comprised so small an area and population, and so many policies were still on trial, that it was impossible for them to achieve a strong effect on the spatial economic pattern of the whole delta in such a few years. As a matter

of fact, in 1984, Guangzhou city was still sharing 41.56% of the delta's GVIAO, a slight decrease from the 49.90% in 1978.

After 1985, a new spatial economic pattern appeared, which displayed two core areas (Figure 3). The first core area lies in the center part of the delta, where Guangzhou, Foshan, Nanhai, Shunde and Jiangmen spread from north to south. The average distribution quotient for this area was 3.28 in 1992. In other words, in 1992, in this core area, approximately 40.43% of the population produced 45.90% of the GVIAO with a mere 14% of the area. The second core area is at the outlet of the Zhujiang River where Shenzhen and Zhuhai face each other on opposite sides of the river. The average distribution quotient for this area was 4.77, where in 1992 about 4.90% of the population produced 18.16% of the GVIAO with only 3.81% of the total area. It is also apparent from Figure 3 that there was still a backward area in the western part of the delta, including Taishan, Enping, Kaiping, Heshan and Gaoming. The average distribution quotient for this lagging area was 0.23 in 1992, indicating that about 17.12% of the population, utilizing about one-third of the total area, produced only 7.77% of the GVIAO.

In sum, the spatial economic pattern in the delta has changed from one where a single core area dominated development in the Maoist era to one where two core areas dominated after 1985, as a result of the spatial impact of the new development strategy. The old pattern is characterized by the monopolization of Guangzhou, encompassed by a vast backward area. The new spatial pattern underlines the prominent role of Shenzhen and Zhuhai. This change of spatial pattern implies that the centrally planned system, under which the Chinese government monopolized most development resources, still had a strong impact on the regional development of China. This was true even in those areas with looser economic control, such as the delta. The Chinese government adjusted its regional priorities not only by offering political-economic privileges to favored areas but also by direct central investment (Yang, 1990). This would explain the rapid economic expansion of Shenzhen and Zhuhai. On the other hand, after 1985 Guangzhou city gained privileges similar to those of Shenzhen and Zhuhai. Its bureaucratic, feudalistic and complex government system had seriously constrained its economic growth. In addition, post-Mao China has attempted to make free market forces a determinant in locating economic activities. This is particularly true in the delta where the regional preference of Hong Kong, Macao and foreign investment mainly mirrors the objective of maximizing profit. Leung (1993) suggests that Hong Kong's production subcontracting activities are widely distributed in the delta, but three centers of concentration, Shenzhen, Dongguan and Guangzhou, can be identified.

Spatial relationship between the industrial and agricultural sectors

The post-Mao development strategy and the resultant economic growth have also brought about a fundamental change in the spatial relationship between the industrial and agricultural sectors. The degree of spatial association between these two economic sectors becomes closer and closer after 1978, as revealed by computing the coefficients of geographic association between the gross value of industrial output (GVIO) and agricultural output (GVAO) using the formula introduced by Rondinelli (1985):

$$\mathrm{La} = 100 - \left[\sum \mathrm{X} - \mathrm{Y} \middle/ 2\right]$$

where X and Y are the percentages of two types of economic activity in each county/city (Table 4). In other words, economic growth in the delta tended to be balanced sectorally from place to place in the reform era.

This close spatial relationship between the industrial and agricultural sectors can only be traced to the post-Mao development strategy. In the Maoist era, following the Soviet

Table 4 *Coefficients of geographic association between the gross value of industrial and agricultural output, 1978–92*

City/County	In78	Ag78	|X-Y|	In84	Ag84	|X-Y|	In87	Ag87	|X-Y|	In92	Ag92	|X-Y|
Guangzhou	62.29	9.17	53.12	50.37	8.22	42.15	35.94	6.97	28.97	24.21	9.85	14.36
Zengcheng	0.58	3.80	3.22	0.47	3.50	3.03	0.69	4.06	3.37	1.13	3.77	2.64
Panyu	2.13	7.12	4.99	2.13	6.01	3.88	2.79	6.77	3.98	3.80	7.36	3.56
Shenzhen	0.00	0.90	0.90	6.06	0.87	5.19	9.64	0.42	9.22	14.31	0.63	13.68
Baoan	0.56	2.62	2.06	1.40	2.44	1.04	1.69	3.22	1.53	2.77	5.09	2.32
Zhuhai	0.38	1.90	1.52	1.38	1.13	0.25	1.83	1.53	0.30	5.16	1.59	3.57
Doumen	0.75	2.31	1.56	0.67	2.39	1.72	0.69	3.50	2.81	1.08	3.80	2.72
Dongguan	3.19	12.10	8.91	2.82	11.85	9.03	5.77	14.75	8.98	6.45	12.66	6.21
Zhongshan	3.98	10.38	6.40	4.91	11.15	6.24	6.29	10.88	4.59	5.71	10.10	4.39
Jiangmen	4.68	0.94	3.74	4.07	1.23	2.84	3.25	0.51	2.74	2.88	0.72	2.16
Xinhui	2.20	6.80	4.60	2.82	5.90	3.08	3.82	7.02	3.20	3.06	6.87	3.81
Taishan	1.24	6.14	4.90	1.52	6.54	5.02	2.26	6.98	4.72	1.86	7.50	5.64
Kaiping	1.35	4.16	2.81	1.06	4.28	3.22	1.76	4.27	2.51	1.93	3.28	1.35
Enping	0.62	2.62	2.00	0.53	2.69	2.16	0.76	4.11	3.35	0.89	3.64	2.75
Heshan	0.48	2.34	1.86	0.57	1.76	1.19	0.81	2.71	1.90	1.38	2.10	0.72
Foshan	5.63	1.26	4.37	7.81	2.42	5.39	6.70	0.68	6.02	7.06	0.85	6.21
Nanhai	3.33	10.84	7.51	4.03	13.97	9.94	6.35	8.19	1.84	6.33	7.32	0.99
Shunde	4.72	10.02	5.30	5.34	10.00	4.66	6.58	7.73	1.15	7.07	7.13	0.06
Gaoming	0.25	1.60	1.35	0.19	1.45	1.26	0.39	2.52	2.13	0.80	2.24	1.44
Sanshui	1.64	2.98	1.34	1.85	2.20	0.35	1.99	3.18	1.19	2.12	3.50	1.38
Total			122.46			111.64			94.50			79.96
La value			38.77			44.18			52.75			60.02

model, the Chinese approach to economic development was strongly affected by military strategy (Kirby and Cannon, 1989; Cannon, 1990). Taking economic activities as an extension of the military and political campaign, Maoist China had undergone an extremely uneven development in the industrial and agricultural sectors and a differentiation between urban and rural areas. Industry was the first priority in the national economy. The structure of the economy was therefore oriented to meeting the desires of the Chinese leadership rather than to the people's need for consumer goods or to the needs of agriculture. Under such circumstances, the separation of the industrial from agricultural sectors became inevitable. In terms of spatial economic distribution, a major characteristic of the Maoist development strategy was concentration. Major industrial areas overlapped with those urban areas with the greatest population density (Howard, 1989). This is why, prior to 1978, industrial production in the delta was concentrated in a few cities such as Guangzhou, Foshan and Jiangmen, and a vast agricultural area surrounded these industrial cities.

The post-Mao strategy began with sharp criticisms of the old economic system. On the agricultural front, Maoist development strategy was accused of having failed to raise the income of peasants, and of having over-controlled their lives and their institutions by means of the cadres in the hierarchical structure of communes, production bridges and production teams. In response, agricultural reform aimed to solve these two central problems. By introducing the rural projects, the Chinese government hoped that the rural economy would flourish, thereby eliminating the differences between urban and rural areas, between workers and peasants, and thus accomplishing the rural urbanization strategy. Reform in industry took place much more slowly than it did in agriculture. The most important measures were as follows. First, the priority of the industrial sector was reversed from heavy to light industry. Second, in the field of industrial growth there was less interest in investment, and more interest in technical change, innovation, producer initiative and efficient use of resources (Lippit, 1987). Third, by introducing the enterprise management responsibility system, and tax and banking systems, decision-making authority was turned from administrative levels over to the enterprises themselves. Finally, material incentives for producers were coupled with and linked to their responsibilities. In order to accomplish all these agricultural and industrial reforms, the establishment of a market system became indispensable. That is to say, Chinese reformers attempted to reshape the Chinese economy from one guided by administrative authorities into one that is market-oriented.

In this context, the industrial and agricultural sectors developed towards one and the same goal, that is, to maximize economic efficiency. Free market forces increasingly became the sole determinant in selecting what kinds of products were to be produced, what modes of production, marketing and management would be employed, and in what locations industrial and agricultural activities would be based. In the delta, those cities and counties with greater market potential, such as close proximity to Hong Kong, better infrastructure, and so on, grew faster in both the industrial and agricultural sectors. The increase in industrial production is largely attributed to joint ventures, cooperative and foreign-owned enterprises, as well as simple processing industries. When these enterprises are located in towns and villages rather than in the urban area of a city and the county-seat town of a county, they are statistically counted as agricultural producers. Most of the agricultural production increase is due to these village-township enterprises, although a portion still comes from market-oriented commercial agriculture. The periphery lags behind in both sectors compared with the core(s). Because of the overlap of market potentials for industrial and agricultural production, the industrial and agricultural sectors grew evenly from place to place. With the growth of free market forces and the development of trade between the industrial and agricultural sectors (Lin, 1997), a trend showing more and more affinity between these two sectors became evident.

Geographic concentration process

The post-Mao development strategy started with the objective of economic efficiency but has never ignored the rational spatial distribution of economic activities. Whether the economic growth and the consequent changes in spatial patterns are consistent with the Chinese classical spatial development objectives is apparently a more critical issue. To provide an answer, the Hoover concentration index (CI) (Isard, 1960; Mulligan, 1991) is employed to identify and measure the process of economic concentration in space within the delta, using the following formula:

$$CI = \left[\sum \left| t_i^* - n_i^* \right|\right] / 2$$

Where t_i^* is the percentage of GVIAO, and n_i^* is the percentage of population in each county/city. The Hoover index varies between 0 and 1. When CI = 0, allocation is identical to reference distribution, i.e. equal spatial distribution; when CI = 1, allocation is concentrated at one observation, i.e. unequal spatial distribution. Therefore, the larger the Hoover index, the higher the degree of concentration. The results of Hoover's index analysis reveal a continual decrease in the degree of spatial economic concentration from the values 0.3163 in 1978 to 0.2759 in 1984, with a sharp decrease in 1987 to 0.2241, levelling out in 1992 to 0.2003 (Figure 4). This decrease in the index indicates a general decline of regional disparity in the delta in the post-Mao era.

The delta was generally undeveloped in 1978. Its cities and counties, except for Guangzhou, earned a very low per capita GVIAO value, even lower than the average for the whole country. However, Guangzhou, with its unique role as the only economic center in southern China and a national base for light and textile industries, produced one half of the total GVIAO. This strong contrast leads to the largest Hoover concentration index, 0.3163.

From 1978 to 1984, due to introduction of the new development strategy, Shenzhen and Zhuhai experienced rapid annual growth rates, while a majority of counties and cities showed an average growth rate. But Shenzhen and Zhuhai cities shared so little in the total GVIAO, that it was impossible for them to counter the development of Guangzhou

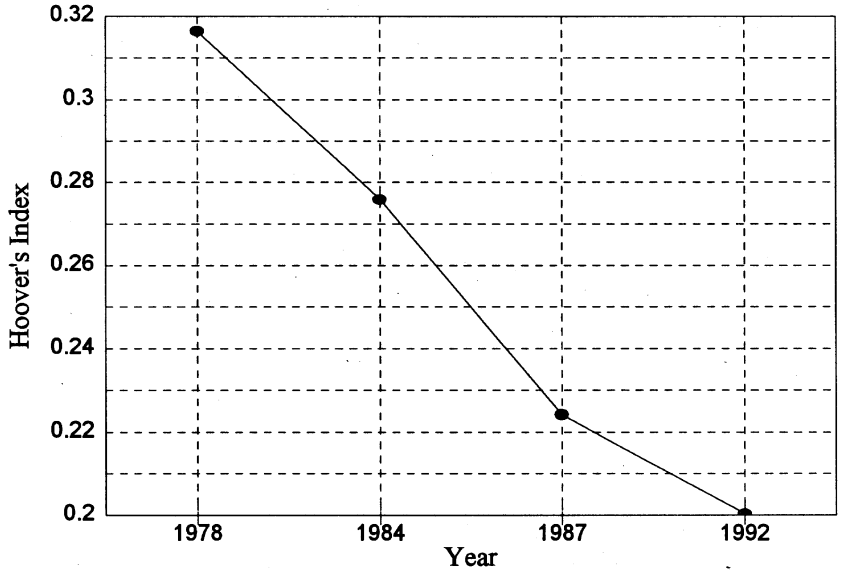

Figure 4 *Geographic concentration process of the economy in the Zhujiang Delta*

city in just a few years. As a result, the Hoover concentration index decreased about 2% per year to 0.2759 in 1984, indicating that the regional disparity declined slowly from 1978 to 1984. The dominant role of Guangzhou city was still apparent in this period.

Between 1984 and 1987, the most advanced city, Guangzhou, grew the slowest. Its annual growth rate was 13.98%, far lower than the average rate of 23.37% for the whole delta. At the same time, all other cities and counties, except for Zengcheng, Doumen, Jiangmen and Foshan, achieved growth rates well above average. Consequently, the regional disparity had a sharp (6.5% per year) decline during the period. This decline is clearly related to the establishment of Zhujiang Delta EOZ in 1985. Only after its establishment could the other cities and counties benefit from a series of preferential policies, and thus develop as rapidly as Shenzhen and Zhuhai.

During the period from 1987 to 1992, the Hoover concentration index further declined to about 0.2 from 0.2241. The annual decline rate of the index returned to about 2.1%. A small change in numbers means much in terms of the relative change in the spatial economic pattern. Because Guangzhou city maintained the lowest growth rate while other cities and counties, particularly those poorest counties such as Zengcheng, Doumen, Kaiping, Enping, Heshan and Gaoming, grew at a rate much faster than the average, the regional disparity further decreased.

In retrospect, the rapid economic growth has provided the delta with a basis for its future economic success and with the potential for a more balanced spatial development. Several favorable conditions are obvious: the predominant role of secondary and tertiary production in generating economic growth; emerging specialization of industry; market-oriented commercial agriculture; rural industrialization and urbanization; maximum utilization of natural and human resources; rudimentarily established infrastructures; and a decentralized decision-making system. Moreover, a well-integrated system of cities, counties and towns has been established to promote the diffusion of benefits from the core to its periphery (Lo, 1989).

The changes in spatial economic patterns were attributable primarily to the efforts of the Chinese government to attract foreign investment and to revitalize its stagnating economy, and to the closeness between the delta and Hong Kong and Macao. The evidence of a more balanced spatial development pattern after 1985, and especially after 1987, indicates that investment, particularly foreign investment, was no longer confined to the SEZs, but began to penetrate into more rural counties due to their lower wages, cheaper land and a continually improving investment environment. Free market forces, in combination with pre-existing kinship or business ties between the delta and Hong Kong and Macao, are increasingly becoming a key determinant of the delta's locational patterns of economic activity. Given this trend, it can be predicted that the current decline in regional disparity will continue, as long as the economic reforms and open door policy continue to ensure the existence of the free market economy.

Discussion and conclusion

This article has examined the spatial impacts of the post-Mao development strategy at the local level in the light of the Zhujiang Delta. The findings of this article are therefore significant for studying its economics, spatial economics and regional planning. Meanwhile, the implications of these findings go beyond the delta, because other parts of China have started to obtain and will eventually have the same development privileges as the delta's.

First, this article finds that the overall economic growth performance between 1978 and 1992 has been extremely strong in spite of fluctuations and an imbalance between the industrial and agricultural sectors. The fluctuating pattern of economic growth in the whole period can be divided into three phases: (1) the foundation period of 1978–84,

when the economy grew from a weak base and was spatially concentrated in a few cities such as Guangzhou; (2) the transition period of 1985–86, when the entire delta was designated as an EOZ and thus all cities and counties drastically expanded their economy; and (3) the period from 1987 to 1992, when the delta started to develop its self-broadening capabilities of economic growth, and Shenzhen and Zhuhai appeared as a new economic core area. Second, the spatial economic pattern in the delta has changed from a one-core pattern in the Maoist era to a two-core pattern after 1985. The old spatial economic pattern was characterized by productive monopolization by Guangzhou city. The new spatial economic pattern displayed two cores: one in the central part of the delta, and the other in the outlet of the Zhujiang River. In association with this change, the strategy has also changed the spatial relationship between the industrial and agricultural sectors to a sectorally even development pattern from place to place. Finally, this article finds that there was a general decline of regional disparity in the delta after 1978. However, only after 1985, and especially after 1987, could a more clearly balanced development pattern be identified. The polarized development pattern, dominated by Guangzhou city, has been gradually undermined by the deepening commitment to the post-Mao development strategy.

This finding differs from a previous observation presented by Lo in 1989, who states that 'spatial inequity in development (in the delta) persists as the core has advanced at a much faster pace than its periphery' (p. 293). The difference of opinions partly reflects the difference in the methods of measurement used as well as in the sample selection. First, Lo's study employed a simple measure of equality, i.e. the range, while this article utilized a distributional equality measure. Simple measures of equality, either minimizing the maximal value or the range, are long found to be very sensitive to the extreme values and insensitive to the distribution between the extreme values, and therefore can only provide a crude measure of distributional equality. Then, in contrast to this article, Lo's study, based on an administrative definition, excluded the primate city of Guangzhou and the two SEZs, Shenzhen and Zhuhai, and to a large extent restricted the examination of the impacts only to the rural area.

More theoretically, most previous studies have endeavored to fit the development of the delta to some form of regional development theory, and to explain the development of the regional disparity within a theoretical framework. In his 1989 study, Lo places the development in the perspective of Friedmann's core-periphery theory, and argues that the spatial inequality (in 1984) is a natural outcome of this theory, which hypothesizes four phases of regional growth: stage 1, of isolated enclave-type spatial development; stage 2, of incipient industrialization dominated by a single strong core surrounded by a periphery; stage 3, of gradual transformation of the core-periphery situation; and a final stage 4, of accomplishment of a functionally interdependent system of cities, a completely absorbed intermetropolitan periphery and a full integration of the economy, minimizing regional disparities (Friedmann, 1966; 1972). Obviously, Lo supports the proposition that the delta is at an early stage of regional development. However, this proposition has been rejected by Ouyang in a recent study. Ouyang (1993) follows some form of the long wave theory (Van Duijn, 1983; Booth, 1986; Amos, 1989; Berry *et al*., 1993), and argues that spatial economy always proceeds from even to uneven to a higher level of even development. He declares that after 1984 the delta has entered a stage of mature, even development, while the rest of Guangdong Province still remains at an uneven development stage.

In contrast, this article finds that the rapid economic growth is a consequence of the rise of simple processing industries in the early stage, and of joint ventures, cooperative and foreign-owned enterprises in the late stage, and of rudimentary, flourishing, market-oriented commercial agricultural production. A relatively balanced development pattern after 1985, and especially after 1987, reflects that investment, particularly foreign investment, was no longer confined to the SEZs, but began to penetrate into more rural counties. In view of the fact that economic expansion in the delta is propelled by simple,

labor-intensive and some import substitution industries which rely highly on the capital, technology and the markets of Hong Kong and Macao, it is too early to judge the advent of a mature economy. For indeed, a mature, even-development pattern can only be observed after a free market economy is well established, and a rational regional division of labor and specialization comes into being.

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