Defence Industrialization in Guangdong

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Ezra Vogel, in the first of his classic works on Guangdong, cites the dream of 20th-century Cantonese of turning Guangzhou "into an industrial as well as a commercial center." The victory of the Chinese Communist Party (CCP) revived these dreams, but they were dashed for a variety of reasons, including "Communist fears of military vulnerability."[1] Guangdong and Guangzhou never did develop into the kind of heavy industrial city comparable to Shenyang, Wuhan or other monuments to Soviet-style socialist visions of industrial power and modernity. As Vogel makes clear in his second classic work on Guangdong, in the long term, and especially in the post-Mao period, this was not a bad thing. One of the reasons that Guangdong was able to take off was because there was much less state-owned heavy industry there at the onset of reforms, and thus the burdens of readjustment and state-owned enterprise reform were relatively light.[2] In his later book, Vogel notes that Guangdong was not without defence industry, especially in the 1960s. But he does not see this playing a major role, and the entire output of heavy industry remained smaller than that of light industry, contrary to national trends, and the pattern in most other provinces.[3]

This article argues that defence industrialization was an important element of Guangdong's industrial development. It consumed significant portions of investment, especially from the late 1950s on, and the prospect of additional resources in connection with the Third Front appears to have been seen as a target of opportunity for Guangdong leaders. Indeed, it seems that Tao Zhu and other top figures from the Central South Bureau of the CCP and Guangdong played a key catalytic role in Mao's thinking about the necessity of the little Third Front. Guangdong was a major producer of uranium, and its refined ore was used in China's first nuclear explosion. It was also a major centre for naval construction. Electronics and light conventional weapons were other significant elements of its defence industries.

But the legacy of this activity is at best ambiguous. Most of the ordnance factories have been closed down, moved, converted to civilian use and/or merged. Many of the other factories appear to have made a reasonably successful transition to civilian production. A number of the defence electronics industries ceased defence production, moved from the

1. Ezra F. Vogel, *Canton under Communism: Programs and Politics in a Provincial Capital, 1949–1968* (New York: Harper Torchbook, 1971) [originally, Harvard University Press, 1969], p. 17.

2. Ezra F. Vogel, *One Step Ahead in China: Guangdong under Reform* (Cambridge, MA: Harvard University Press, 1989), esp. ch. 1. See also Nicholas R. Lardy, *Foreign Trade and Economic Reform in China, 1978–1990* (Cambridge: Cambridge University Press, 1992), pp. 126–136.

3. Vogel, *One Step Ahead*, pp. 36, 230–31 and 240.

mountainous areas to the cities, were split up, and became the basis of some of Guangdong's larger and newer electronics firms. While the opening to the outside world and reform have dramatically altered the political economy of Guangdong, new enterprises with defence capabilities have also been established.

This article examines the course of development of the defence industry in Guangdong. It focuses on enterprises that produce items for the People's Liberation Army (PLA) for war fighting. It does not discuss enterprises owned by the PLA or located on PLA bases, nor *peitao* or co-ordinated civilian enterprises that provided needed inputs for defence products. In short it looks at Guangdong's military industrial complex, not the PLA's business empire, though it is likely that there are overlaps between the two. The first part of the article examines some aggregate data about Guangdong's economy and the role of the defence industry within it, and evaluates the Guangdong experience with those of some other provincial level units. It then examines the historical development of defence industry in Guangdong. While naval shipbuilding was well established in the 1950s, the nuclear industry and defence electronics really started during the Great Leap Forward, and conventional weapons took off with the Third Front in 1964. A new upsurge in defence industrial construction was to be launched in connection with the Fourth Five-Year Plan (1971–75), but the fall of Lin Biao and his supporters in the PLA high command and Sino-American détente seems to have put an end to some extremely grandiose plans. By the late 1970s and early 1980s, all branches of the defence industry were undergoing readjustment and at least partial conversion to civilian production.

Guangdong is a coastal province. In light of the numerous confrontations with the United States, the Chinese leadership decided in the early 1950s to locate most defence industrial enterprises out of bombing range of American aircraft (shipyards were an understandable exception).[4] As a result, one would not expect Guangdong to have a major defence industrial base, and as will be shown, it was certainly not one of the most important centres of China's military industrial complex. Indeed, one might argue the reverse. As an exposed coastal province, near both Taiwan and Vietnam, Guangdong might be expected to have large military forces deployed within its borders, but to not have many defence industrial facilities because of their vulnerability. Therefore, it might be seen as a critical case. If it can be shown that defence industrialization was a major element of Guangdong's industrial experience, the same conclusion might be drawn for the vast majority of China's provincial level units, at least for the Mao period, if not beyond.

4. Bo Yibo, *Ruogan zhongda juece yu shijian de huigu, shang juan* (*Recollections of Some Important Policies and Developments, volume* 1) (Beijing: Zhonggong zhongyang dangxiao chubanshe, 1991), p. 298.

Defence Industry in Guangdong: Aggregates

In 1985, China conducted an industrial census, the first ever made public. The findings were published in ten volumes in 1987.[5] Volume 1 contained aggregate data from 8,285 large and medium-sized industrial enterprises – apparently all such enterprises that were not joint ventures between Chinese and foreign investors. Volume 2 presented data on 7,592 large and medium factories, including their addresses, year production began, output in 1985 (in 1980 constant *yuan*), workers and staff at year-end 1985, and enterprise fixed capital (again in 1980 constant *yuan*).[6] Thus, I concluded as a first approximation that the 693 enterprise difference between the aggregate totals in Volume 1 and the individual listings in Volume 2 are defence enterprises.[7]

The 1985 census divided industry into 39 major sectors. I entered each enterprise in Volume 2 into spreadsheets based on the then 29 provincial level units in China, by sector. (Hainan was then still part of Guangdong, and it will be treated as part of Guangdong throughout this article.) Volume 1 of the industrial census provided aggregate data on 453 large and medium enterprises, but 433 were identified in Volume 2. The 20 enterprise difference between Volume 1 and Volume 2 data is likely to represent Guangdong defence industries.

From this data collection and sorting, these 20 large and medium enterprises in 1985 had an output of 183.7 million *yuan*, slightly more than 27,000 employees and fixed capital of 576.2 million *yuan*. These figures represented 4.4 per cent of provincial totals of large and medium industrial enterprises (excluding joint ventures, the same hereafter), 1.1 per cent of output, 4.2 per cent of employment and 4.4 per cent of fixed capital. This excludes a number of large enterprises that had already been converted to civilian production (see below). Nationally, Guangdong ranked 17th in terms of numbers of large and medium defence industrial enterprises, 21st in terms of output, 21st in terms of labour and 16th in terms of capital. In all Guangdong, there were 16,981 industrial enterprises, with a gross value of industrial output of about 43 billion *yuan*, approximately 3,200,000 workers and staff, and fixed assets of about 28.5 billion *yuan*. Large and medium-sized enterprises represented 2.78 per cent of all enterprises, 39 per cent of output, 40 per cent of

5. *Zhonghua renmin gongheguo 1985 nian gongye pucha ziliao* (*Materials from the 1985 Industrial Census of the PRC*) (Beijing: Zhongguo tongji chubanshe, 1987) (hereafter, *Gongye pucha*).

6. Volume 2 explicitly states that defence enterprises and joint ventures are excluded from the 7,592 enterprises listed. However, the same volume also contained a separate list of large and medium industrial joint ventures, though significantly fewer data were provided. It was clear that joint ventures were not included in the aggregate totals for large and medium enterprises in Volume 1.

7. This is clearly an approximation. The 693 figure includes both defence and PLA enterprises. However, many originally defence oriented enterprises in the space, naval and electronics sectors are listed in the 7,592 enterprises in Volume 2 of the census. Indeed, even some ordinance enterprises are listed. I draw this inference from the only complete list of large and medium enterprises (including management relations) I have been able to find. See *Hebei jingji tongji nianjian 1987 (Hebei Economic Statistical Yearbook 1987)* (Beijing: Zhongguo tongji chubanshe, 1987), pp. 408–431. This list is based on 1986 figures.

employment, 41 per cent of all capital and 62 per cent of all profits and taxes.[8] Large and medium defence enterprises in Guangdong constituted 0.12 per cent of all enterprises, produced 0.43 per cent of the gross value of industrial output, employed 0.85 per cent of the industrial labour force, and held 2 per cent of all industrial fixed assets and 3.4 per cent of the fixed assets of heavy industry in Guangdong in 1985. Except for the percentages of fixed investment, these numbers are trivial. Even for fixed investment, the percentages are certainly not large, but the fact that 20 enterprises account for 2 per cent of all industrial fixed assets (and probably 3.4 per cent of heavy industrial fixed assets, as I assume that all defence enterprises are heavy industrial enterprises[9]) suggests how capital intensive these enterprises are. Other things being equal, it is reasonable to assume that these 20 enterprises will have a fair amount of political influence given the concentrated nature of the capital they embody.

Guangdong's Defence Industry in Comparative Perspective

Monographs on provincial level defence industries are available for Beijing, Hebei, Shanxi, Gansu, Jiangsu, Anhui, Guangxi and Guangdong.[10] Table 1 presents what these materials reveal about defence industrialization in these eight provincial level units, with relevant national aggregates.[11] The monographs used for this table are inconsistent. The Anhui and Guangxi volumes have some data on PLA enterprises, while the others have not. Defence electronics data are inconsistently

8. *Gongye pucha*, Vol. 4 (provincial data), pp. 6–7, 10–16 and 222–23. For reasons that are not explained, the number of large and medium enterprises in Guangdong given in volume 4 is 472, whereas in volume 1 (the volume on large and medium enterprises) the total is 453. I take 453 as the better figure, but cannot reconcile the discrepancy, presumably drawing on the same sampling procedures.

9. This is a reasonable assumption. For a discussion of what constitutes light and heavy industry as of the early 1980s, see Sun Jingzhi (ed.), *The Economic Geography of China* (Hong Kong: Oxford University Press, 1988), p. 72. The chart cited here unambiguously places electronics in the heavy industry category, and the majority of the remaining industries seem to fit heavy industry neatly.

10. *Dangdai Beijing guofang gongye (The National Defence Industry of Contemporary Beijing)* (Beijing: Beijing ribao chubanshe, 1990); *Hebei sheng zhi, di 34 juan: guofang keji gongye zhi* (*Hebei Provincial Gazetteer, Vol. 34: National Defence Science, Technology, and Industry Volume*) (Beijing: Zhongguo shuji chubanshe, 1995); *Shanxi tongzhi, di 18 juan: junshi gongye zhi* (*Shanxi History, Vol. 18: Military Industry Volume*) (Beijing: Zhonghua shuju, 1997); *Shanxi jungong jianshe* (*Shanxi Military Industry Construction*) (Taiyuan: shanxi kexue jishu chubanshe, 1993); *Gansu sheng zhi, di 43 juan: junshi gongye zhi* (*Gansu Provincial Gazetteer: Vol. 43: Military Industry Volume*) (Lanzhou: Lanzhou renmin chubanshe, 1992); *Gansu san xian jianshe* (*Third Front Construction in Gansu*) (Lanzhou: Lanzhou daxue chubanshe, 1993); *Jiangsu sheng zhi: junshi gongye zhi* (*Jiangsu Gazetteer: Military Industry Volume*) (Nanjing: Jiangsu renmin chubanshe, 2000); *Anhui sheng zhi: junshi gongye zhi* (*Anhui Provincial Gazetteer: Military Industry Volume*) (n.p.: Anhui renmin chubanshe, 1996); *Guangxi guofang gongye* (*Guangxi National Defence Industry*) (Nanning: n.p., 1996); *Guangdong sheng zhi: junshi gongye zhi* (*Guangdong Provincial Gazetteer: Military Industry Volume*) (n.p.: Guangdong renmin chubanshe, 1995); and *Guangdong jungong ziliao (2), 1949–1987* (*Guangdong Military Industry Materials, 2, 1949–1987*) (n.p., n.d. [1990?]).

11. Sources for Table 1 include the monographs listed in n. 10 for the provincial data. Aggregate data for China as a whole come from the 1985 Industrial Census. Data for

Table 1: **Provincial Level Defence Industries, ca. 1980–85**

	National total	*Beijing*	*Hebei*	*Shanxi*	*Gansu*	*Jiangsu*	*Anhui*	*Guangxi*	*Guangdong*
Large and medium enterprises	8,225	391	310	223	160	602	205	211	453
Military enterprises from census	693	12	40	36	26	17	24	9	20
Ordnance enterprises	460	11	25	35	10	12	22	7	14
of which:									
Centrally managed (in 1990)	157	4	8	17	1	3	0	0	2
Big Third Front			8	11	4	0	0	0	4
Little Third Front	229	6	17	7	5	9	22	7	10
Naval	_	1	2	3	0	8	7	7	3
Aviation	143	4	3	1	2	5	3	2	0
Space	94	11	0	2	0	1	0	1	0
Electronics	_	12	5	10	10	10	9	2	8
Nuclear	61	1	0	0	7	3	0	1	3
Military enterprises from monographs	_	40	35	51	29	39	41	20	28
PLA Logistics Department enterprises, 1985	369	_	_	_	_	_	_	_	_
Known big and medium PLA firms, 1995	_	8	16	5	7	12	1	0	6

reported across the monographs. The Beijing volume is the least revealing. The volumes treat co-ordinated enterprises (*peitao*) differently. Anhui and Guangxi appear to include these enterprises in their totals, but the other provincial level units do not. The Anhui volume notes that Anhui served as a little Third Front area of Shanghai, which either transferred or established 80 enterprises in Anhui, and Jiangsu, which built five in Anhui. No information is provided about the Shanghai construction, but four of the five Jiangsu enterprises in Anhui were little Third Front ordnance plants, and the table includes the four in the totals. Perhaps most importantly, in most cases, it is not known whether an enterprise is large, medium or small. Just because an enterprise was listed in a defence industry monograph does not mean that it was of a certain scale, though given the planned nature of the defence industry, the complete state ownership of this sector and the security elements presumably associated with military production, defence enterprises are likely to be medium or large in size.

Despite these caveats, this table provides suggestive information on provincial defence industrialization. The monographic literature suggests that there were 100 more defence enterprises in these eight provincial level units than could be derived from the industrial census. Guangdong ranked seventh in terms of aggregate numbers. The two Lingnan provincial level units (Guangdong and Guangxi) had significantly fewer defence enterprises than did any other set of bordering units (Beijing-Hebei, Hebei-Shanxi, Jiangsu-Anhui). On an individual basis, only Gansu had approximately the same number of defence enterprises as Guangdong. But Gansu has only about a third the population of Guangdong (and half that of Guangxi). Moreover, Gansu contains some of the largest and most important defence enterprises in China: State Factory 404, the Jiuquan Atomic Energy Complex; State Factory 504, the Lanzhou Gaseous Diffusion Factory; the State Factory 805, the Gansu Yinguang Chemical Co., as well as two of the Soviet "156" turnkey factories transferred to China in the 1950s. While there were important defence enterprises in the Lingnan, these were significantly less important and less difficult to replace than those in Gansu.

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footnote continued

particular defence sectors come from Vol. 3, pp. 122–25. Data on centrally managed ordnance enterprises and little Third Front enterprises (local defence enterprises) come from *Zhongguo binggong nianjian 1986–1990* (*China Ordinance Industry Yearbook [sic], 1986–1990*) (Beijing: Bingqi gongye chubanshe, 1991), pp. 911–921 and 152. Data on PLA enterprises compiled from *Top 22,000 Businesses in P.R China 1996 [2 volumes]* (Hong Kong: China International Business Investigation Co., Ltd., 1996), *passim*. Note I have excluded aggregate totals from "Navy" because the shipbuilding industry in China is too diverse to categorize as all military related (fishing trawlers would be included here for example). A similar situation exists with "electronics," though here sources reveal that defence electronics constituted a significant majority of electronics output by large enterprises as late as 1978. The shipbuilding and electronics sectors were the earliest defence sectors to convert to civilian production, and in general have been much more successful about it than were the other sectors. In addition, Volume 3 of the industrial census states that there were 10 enterprises under the Commission for Science, Technology, and Industry for National Defence, which I have not been able to allocate to any particular sector.

Further contrasts and patterns could be drawn from this non-random comparison of eight provincial level units. But without data on the other provinces, such comparisons would have limited utility. For example, none of these eight provincial level units is among the top four provinces with defence enterprises (Sichuan, Guizhou, Shaanxi and Liaoning).[12] It is safe to conclude that defence industrialization was not as important to Guangdong as it was to six of the other provincial level units on the table, and to at least ten in total.

The Defence Industry in Guangdong[13]

The defence industry in Guangdong developed slowly, and in important ways, its development corresponded to national trends. In particular, upsurges in defence industrialization corresponded to various major mobilizations in China. Thus, the Great Leap Forward correlated with the spread of defence industrialization in Guangdong from naval shipbuilding into the nuclear and electronics industries. The Third Front and the Cultural Revolution saw expansion of all the existing defence industrial sectors, and the creation of Guangdong's conventional ordnance industries. Finally, the reform period has seen the demobilization of much of Guangdong's defence industries, though there appears to be continued growth in the area of defence electronics (coupled with civilian production). Nevertheless, many industries converted to overwhelmingly civilian production retain either some minimal level of defence production or the capability to return to much higher levels of such production.

In PRC history, the first defence enterprise in Guangdong was the Huangpu Shipyard, which traces its origins back to 1845 and the aftermath of the Opium War. When PLA troops arrived in Guangzhou in October 1949, they found only 86 workers at the ship repair yards that would become Huangpu Shipyard, later to take on the code number of State 427 Factory. It quickly became the major repair base for naval forces in the Central South region, and later for the PLA Navy's Southern Fleet. By 1952, it was expanded to begin manufacturing as well as repair tasks. Huangpu built a variety of vessels, but much of its military history was concerned with building type 33 (Soviet R class, or "Romeo," conventional powered) submarines, which remain the most common type of submarine in the PLA Navy to this day.[14]

12. This conclusion is derived from my book project, and draws on the 1985 industrial census as well as monographs on the defence industry in Shenyang and Chongqing, various volumes of the Sichuan and Guizhou gazetteers, and various sources on Shaanxi, including a provincial encyclopedia.

13. The description of Guangdong's defence industries draws overwhelmingly from the two books on Guangdong's defence industry cited in n. 10. Hereafter, *Guangdong jungong shi liao (2)* will be abbreviated as *JGSL*, and *Guangdong sheng zhi: junshi gongye zhi* will be abbreviated as *GDSZ* .

14. *JGSL*, pp. 1–5, 21–29 and 144–150.

Table 2: **Defence Industries in Guangdong**

Enterprise	*Codename, other names*	*Started*	*Location*	*Product(s)*	*Other*
Shipbuilding					
Huangpu Shipyard	State 427 Factory	1949 (1845)	Guangzhou	submarines, naval craft	converted to civilian production
Guangzhou Shipyard	State 433 Factory	1954	Guangzhou	surface naval craft	converted to civilian production
Ordnance industry					
Beijiang Machinery Factory	980 Factory	1965	Liannan Xian	semi-automatic rifles	little Third Front, moved to Foshan
Nanfang Machinery Factory	5606 Factory; Construction Project No 701	1970	Lian Xian	14.5 mm aa guns	big Third Front, merged with following firm
Nanfang Repair and Assembly F	5616 Factory: 701 Const Project	1970	Lian Xian	same as above	same as above, never produced guns
Weiguo Machinery Factory	5693 Factory, 711 Const Project	1970	Lian Xian	30mm shells for aircraft	big Third Front, moved to Huizhou
Lingnan Tool Factory	946 Factory	1965	Lian Xian	7.62 mm ammunition	little Third Front
Hainan Guanghua Machinery F	9671 Factory	1966	Qiongshan Xian, Hainan	7.62 mm ammunition	little Third Front
Minghua Machinery F	806 F; also Yuejin Iron Factory	1966	Liannan Xian	hand grenades, shells	little Third Front
Hainan Nanjiang Machinery F	596 F, Hainan Agricultural Tools	1965	Qiongshan Xian, Hainan	land mines	little Third Front
Changzheng Machinery F	8402 Factory	1967	Fengkai Xian	nautical mines	little Third Front, converted in 1986
Weimin Machinery Factory	5625 Factory, 715 Const Project	1971	Lechang Xian	explosives	little Third Front, closed in 1985
Lihua Processing Factory	9655 Factory	1967	Lian Xian	explosives	little Third Front, merged with other firm, 1987
Hainan Processing Factory	9665 Factory	1965	Qiongshan Xian Hainan	explosives	little Third Front

Table 2: ***Continued***

Enterprise	*Codename, other names*	*Started*	*Location*	*Product(s)*	*Other*
Xingguang Industrial Molding Tools F	9609 Factory	1966	Lian Xian	bullets, mouldings	little Third Front, merged, moved to Foshan
Guangzhou Optical Fiber Factory	5628 F, 712 Construction Project	1970	Yangshan Xian	night vision equipment	big Third Front, moved to Guangzhou
Defence electronics					
Guangzhou Radio Factory	750 Factory, Nanhua Machinery	1955	Guangzhou	naval communications	–
Guangzhou Shuguang Radio F	–		Guangzhou	airborne radar	–
Guangzhou Nanhai Machinery F	–		Guangzhou	airborne radar (69–78)	–
Shantou Ultra-Sound Equipment F	–		Shantou	used in nuclear sub	–
Zhanjiang Radio Factory No 5	–		Zhanjiang	equipment for ICBM	–
Zhanjiang Radio Factory No 1	–		Zhanjiang	equipment for satellite	–
Guangzhou Wired Broadcast F	–	1956, 1964	Guangzhou	–	started military production in 1964
5th Research Institute	numerous name changes	1958	Guangzhou	–	–
7th Research Institute	originally 794 F, State Shahe Electronic Component F, other	–	–	–	
Honggan Electrical Machinery F	8500 Factory	1967	Lian Xian	radio equipment	Third Front, moved to coast in 1979
Xianfeng Machinery Factory	8571, Factory	1971	Lian Xian	–	Third Front, moved to coast in 1979
Guangdong Semiconductor Components Factory	8532 F, Guangzhou Radio Comp Fact No 2, Dongfang Hong Electronic Component F	1969	Lian Xian	–	moved from Guangzhou in 1969; back in 1979

Nuclear industry					
741 Mine	–	1959	Wenyuan Xian	uranium ore	includes hydrometallurgy plant
743 Mine	–	1963	Nanxiong Xian	uranium ore, radium	includes hydrometallurgy plant
745 Mine	–	1969	Renhua Xian	uranium ore	includes hydrometallurgy plant
Other mentioned enterprises					
Posts & Telecom Bureau 524 F	Guangzhou Posts & Telecom Equipment Factory		Guangzhou	–	–
6401 Factory	Wanli Machinery F, 716 Const Project		Fengkai Xian	ship propellors	–
101 Fertilizer Factory	Llanyang Chemical Fertilizer F		Lian Xian	–	–
Cement Factory	–		Lian Xian	–	–
9716 Factory	–	–	–	–	–
309 Factory	–	–	–	explosives, fuses	–
Siwangzhang 401 Factory	–	–	–	explosives	–
Nanhai Chemical Factory	–	–	–	fuses	
Warehouses and other					
Guangdong Provincial 201 Hospital	Guangkeng Hospital	–	Liannan Xian	–	–
385 Warehouse	–	–	Lian Xian	–	–
6th Ministry of Machine Building	–	–	Guangzhou	–	–
Central South Supply Station					
Guangzhou Electronic Equipment Station	–	–	Guangzhou	–	–
Pingshi Warehouse	–	–	Lechang Xian	–	–
Technical School for Uranium Mines	–	–	1984 Shaoguan City	–	–

Also in the early 1950s, what would become the Guangzhou Shipyard (433 Factory) began to take shape, though it too traced antecedent facilities back to the Qing. It did not formally take on the name Guangzhou Shipyard permanently until 1958, but it began naval construction in 1954, becoming a production base for the Type 2 fast torpedo boat that was one of the five kinds of naval craft the Soviet Union agreed to provide blueprints for in the Sino-Soviet Naval Agreement of 1953.[15] Given the recurrent, though relatively minor battles between the PLA and Taiwan naval forces throughout the 1950s and well into the 1960s, Guangzhou and the Guangzhou Shipyard became a front-line production unit for surface naval vessels.[16] Starting from small naval craft and building up, Guangzhou Shipyard became a producer of major surface craft, including the PRC's largest guided missile destroyers by the middle to end of the 1970s. Between 1956 and 1987, it produced 190 warships of various types, and 93 naval auxiliary vessels (starting in 1950) as well as civilian vessels.[17]

Both shipyards went through expansions during the Great Leap Forward, the 1964–66 and 1969–73 periods, tracking the pattern of mobilization of the entire defence industrial sector nation-wide. The PLA Navy was perhaps a little slow to get on the Great Leap bandwagon, but by May 1960 it had drawn up "plans" to build 210 submarines, 400 missile craft and 100 major surface combatants (altogether, 600,000 tons) within eight years.[18] It was not until more than a year later that readjustment struck these two shipyards. Both again began gearing up for expanded production in 1964–66, but this was disrupted by the Cultural Revolution. Finally, a gigantic scheme for the Fourth Five-Year Plan was developed (see below),[19] but this was greatly reduced after the fall of Lin Biao. But as a result of this scheme and earlier decisions, Guangzhou Shipyard produced five Luda Class (type 51) destroyers, and Huangpu produced or assembled 13 type 33 submarines, along with other vessels.

The histories of the Guangdong defence industry provide next to no information on enterprises that provided products for these two shipyards. Some of the electronics enterprises did provide naval communication

15. On the "6.4" Naval Agreement with the Soviet Union, see *Xiao Jinguang huiyi lu (xuji)* (*Memoirs of Xiao Jinguang, continuation*) (Beijing: Jiefang jun chubanshe, 1988), pp. 100–107 and Cheng Wang (chief ed.), *Dangdai Zhongguo de chuanbo gongye* (*The Shipbuilding Industry of Contemporary China*) (Beijing: Dangdai Zhongguo chubanshe, 1992), pp. 39–46. Sino-Soviet naval relations are reviewed in David G. Mueller, Jr., *China as a Maritime Power* (Boulder: Westview Press, 1983), part 1 and John Wilson Lewis and Xue Litai, *China's Strategic Seapower* (Stanford: Stanford University Press, 1994), especially ch. 1.

16. On various naval battles between PRC and Taiwan forces, see Mueller, *China as a Maritime Power*, n. 12, pp. 20–28 and *passim*; Yang Guoyu (chief ed.), *Dangdai Zhongguo haijun* (*The Navy of Contemporary China*) (Beijing: Zhongguo shehui kexue chubanshe, 1987), especially chs. 7, 8 and 14; and Han Huaizhi (chief ed.), *Dangdai Zhongguo jundui de junshi gongzuo, shang* (*The Military Affairs of the Military of Contemporary China, Vol. 1*) (Beijing: zhongguo shehui kexue chubanshe, 1989), pp. 134–161, 221–271 and 340–354.

17. *JGSL*, pp. 1–5, 21–29 and 131–144.

18. Haijun Shi Bianwei (ed.), *Haijun shi* (*History of the Navy*) (Beijing: Jiefang jun chubanshe, 1989), p. 55.

19. *JGSL*, pp. 524–535.

equipment, and there are hints that many were supposed to service shipbuilding, but the extent of the network of suppliers to the two big shipyards is left undiscussed. There is a mention of more than 30 workshops and factories selected to provide ancillary equipment for naval shipbuilding being planned in 1969 in Zhaoqing, Guangzhou and Foshan, and that this ended the situation whereby Guangdong could not provide the machinery and equipment needed for ships, but no other details were provided.[20]

The Great Leap also gave a major impetus to the defence electronics industry in Guangdong. The four original defence electronics units began to form in the mid-1950s, but became major military units during the Great Leap, or as a result of amalgamations during this period. Thus, the Guangzhou Radio Factory was formed in the mid-1950s, began to produce military products in October 1959, and became a defence industry factory in 1960, acquiring the code number State 750 Factory and going through a number of name changes. Guangzhou Wired Electronics Factory was formed on the basis of 17 collective plants in 1958, and began military production in 1964. What became the Fifth Research Institute (after numerous name changes) of the Ministry of Machinery and Electronics (as of the late 1980s) started in 1955 as the China Tropical Communications Equipment Research Institute, came under the Ministry of Defence's leadership in 1960, and worked on environmental testing of equipment. Finally, the Guangzhou Guoguang Broadcast Equipment Factory, also known as the State Shahe Electronic Component Factory and State 794 Factory, was formed in 1958. It was the largest electronic component manufacturer in the Central-South region in 1964, when it was turned into what became the Seventh Research Institute of the Ministry of Machinery and Electronics.[21]

In the mid-1960s, three little Third Front defence electronics firms were established in the northern part of Guangdong. In addition, about half a dozen local electronics firms in Guangdong were tasked with defence industrial production tasks.[22]

The Great Leap also marked the first high tide in the nuclear industry in Guangdong. Uranium surveying and prospecting began in the mid-1950s, and would take on mass campaign characteristics during the Great Leap.[23] By 1958, significant deposits had been identified in Guangdong (straddling the border with Jiangxi), and initial production and processing began in 1959, using "native methods" (*tufa*) that were praised during the Great Leap. But while uranium from what was to become State Mine 741, with its headquarters in Wengyuan Xian, was to be used in China's first nuclear weapons test, the effects of the Great Leap catastrophe slowed

20. *GDSZ*, pp. 30 and 89.
21. *JGSL*, pp. 10–13, 30–31 and 166–202.
22. *GDSZ*, pp. 122–25.
23. For overviews, see Liu Jie (chief ed.), *Dangdai Zhongguo de he gongye* (*The Nuclear Industry of Contemporary China*) (Beijing: Zhongguo shehui kexue chubanshe, 1987), pp. 22–30 and 101–165, and John Wilson Lewis and Xue Lital, *China Builds the Bomb* (Stanford: Stanford University Press, 1988), chapter 4.

down developmental efforts. However, by the end of 1963, the Second Ministry of Machine Building (nuclear industry) authorized a massive search for uranium deposits, and large numbers of geological prospecting personnel descended on Guangdong. Two additional mines were developed as a result of this prospecting, becoming Mines 743 and 745.[24]

While the two shipbuilding yards and the uranium mines were to be the most capital-intensive enterprises among Guangdong's defence related enterprises, the Third Front was to provide the impetus for major quantitative growth in the number of defence factories. Guangdong played a major role in crystallizing Mao's thinking about the big and small Third Front, as will be discussed in more detail below. Guangdong appears to have been the first province to mobilize around Third Front programmes. As a result, four big Third Front and ten small Third Front ordnance factories and three electronics factories were established, mostly in the mountainous areas in what is now the Shaoguan municipal region and in Qiongshan Xian in Hainan.[25] Most of the small Third Front enterprises quickly went into construction and production, and supplied basic armaments for infantry: combat rifles, ammunition, grenades and other light equipment. The big Third Front enterprises were for far more technically complex weapons and military supplies: anti-aircraft guns, aircraft bullets and night vision equipment. Construction on them was started after 1969; three of the four never fulfilled their designed purposes. Yet these enterprises composed a significant portion of all industrial capital construction in Guangdong from 1965 to the end of the Mao period, as shown below.

In addition to the big and small Third Front enterprises, "mobilization production lines" were established in Guangdong's cities, beginning in 1969. These were based on co-operative arrangements between existing civilian enterprises with one or two factories serving as the final assembly factory. Thus, one mobilization production line in Guangzhou, involving ten bureaus and 51 enterprises, was to make Type 701 helicopters (a copy of a Bell helicopter model), with the Guangzhou No. 2 Machinery Factory serving as the general assembly factory. Two helicopters (and most of the parts for two others) were built in the early 1970s before production and testing was transferred to Shandong in 1976. Fourteen Guangzhou enterprises formed the mobilization production line for 14.5 mm double barrelled anti-aircraft guns, with the Guangzhou People's Machinery Factory serving as the general assembly plant for the gun and the Guangzhou Optical Instruments Factory as the assembly plant for its sights. Two other lines existed in Guangzhou, for 37mm anti-aircraft guns and for 7.62 mm semi-automatic rifles, involving a total of 33 enterprises. Other mobilization production lines were set up in Foshan

24. *JGSL*, pp. 13–16, 33–35, 151–165, 311–320 and 540–581.

25. *JGSL*, p. 6 says that four big and eleven little Third Front ordinance enterprises were established. However, details on only ten little Third Front enterprises are presented. See for example, pp. 6–8 and 99–124 for details on Third Front ordnance factories; and pp. 169–174 on Third Front electronics industries.

(semi-automatic rifles, 19 enterprises), Zhanjiang (semi-automatic rifles, 18 enterprises), Shantou (semi-automatic rifles, 16 enterprises) and Mei Xian (rifles, 16 enterprises). Other smaller mobilization lines were set up to produce anti-chemical weapons equipment, aircraft auxiliary fuel tanks, and certain types of metal plates and strips. In short, a significant portion of Guangdong's non-military enterprises were put on a war footing during the Cultural Revolution decade.[26] Moreover, 13 planned mobilization lines, involving 150 more enterprises, were cancelled in the early 1970s.

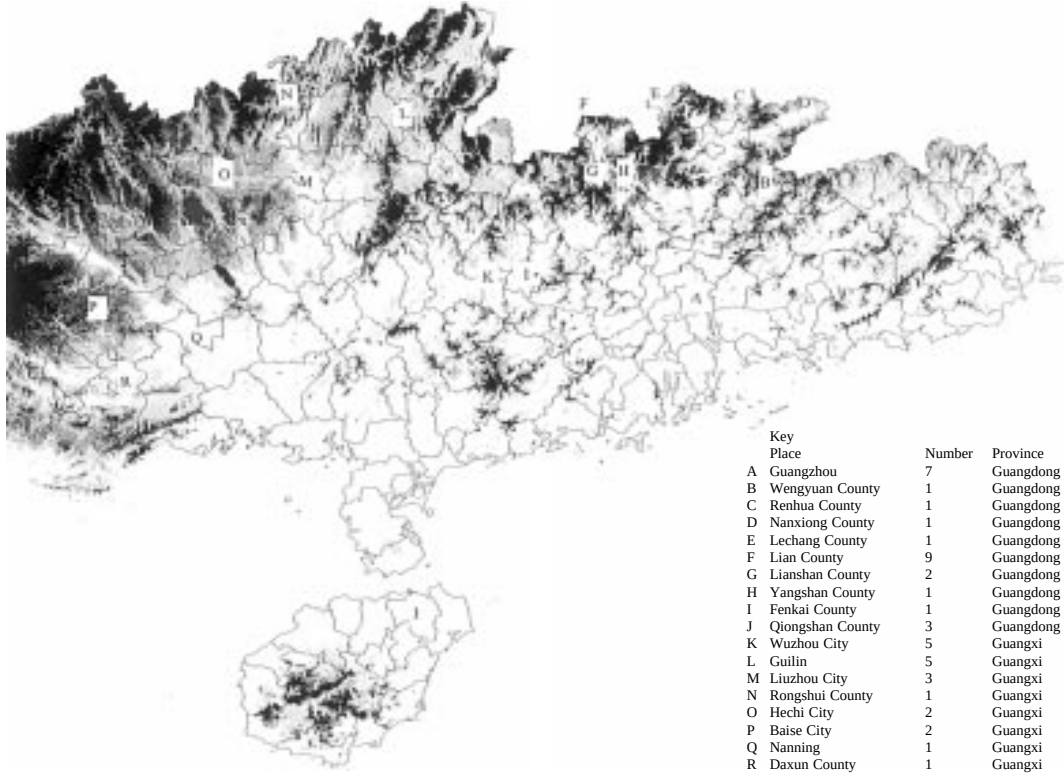
A related element of Cultural Revolution war mobilization was a fantastic increase in the number of civilian explosives enterprises nationwide. In 1965, there were more than 60 such enterprises in China. By 1981, there were 1,033.[27] The management of these enterprises was usually local, but they had corresponding relations (*guikou*) with military industrial hierarchies. As late as 1990, the Guangdong Provincial National Defence Science Technology and Industry Office was setting production targets for civilian explosives enterprises.[28] Presumably, civilian explosives enterprises can be converted to military uses reasonably easily.

Defence industrialization and production continued into the early post-Mao period. Not surprisingly, the Third Plenum of the 11th Central Committee is seen as a decisive turning point in the history of Guangdong's defence industry, as most of the factories in the Shaoguan region were moved to coastal areas and converted to civilian production to various degrees.

Nevertheless, with economic reform a new basis for defence industrialization may be forming, particularly in the electronics sector, where Guangdong is one of the national leaders. More than ten new electronics firms that combine civilian and military production have been established in the Shenzhen area. They include: Zhongyuanda Communications Co., Tongguang Electronics Co, Ltd., Communications Technical Development Co., Guangjian (Fibre Optics) Communications Industrial Co., Aihua Electronics Co., Ltd., Nanhe Electronics Co., Huada Electronics Co. and Changlong Railroad Electronics Co., Ltd. The names suggest that a number of these enterprises are joint ventures. In all, there are more than 20 electronics units in Guangdong that either produce or can quickly move to produce defence electronics products as of the late 1980s.[29] As late as June 1992, the Commission on Science, Technology and Industry for National Defence (COSTIND) affirmed that at least eight Guangdong units were to maintain the ability to supply defence needs – most in electronics and shipbuilding.[30]

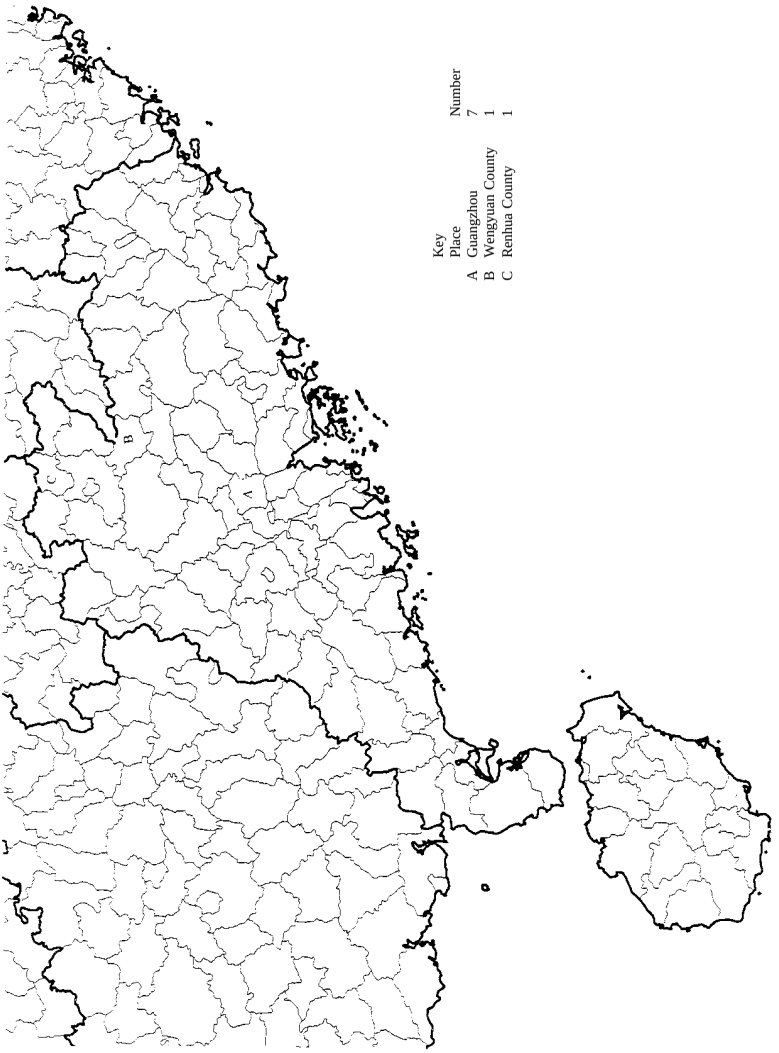
26. *JGSL*, pp. 8–10 and 125–130; *GDSZ*, pp. 84–88.
27. *Zhongguo binggong nianjian*, p. 146.
28. *GDSZ*, p. 45.
29. *JGSL*, p. 166 on the 20 plus electronics enterprises. On readjustment of military enterprises, see pp. 43–47. Page 44 notes that only 3% of the Guangzhou Radio Factory's production is military and more than 90% of the two big shipyards' production are civilian.
30. *GDSZ*, p. 50.

Map 1: **Defence Industries in the Lingnan, ca 1980**

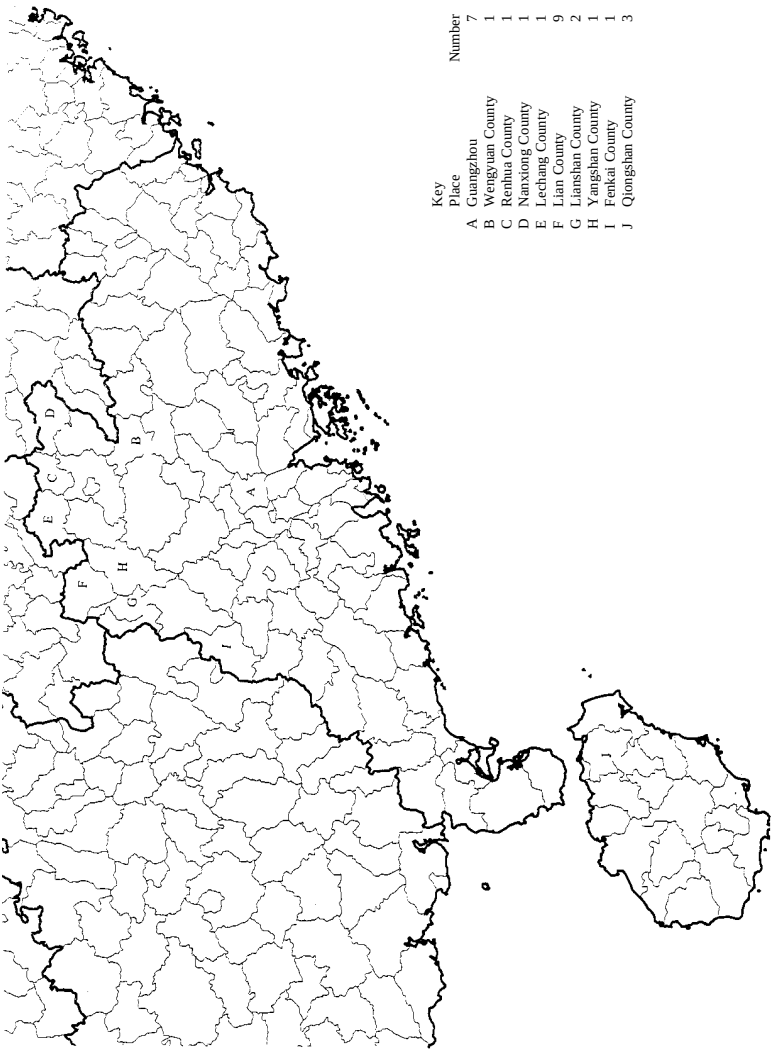


Key			
	Place	Number	Province
A	Guangzhou	7	Guangdong
B	Wengyuan County	1	Guangdong
C	Renhua County	1	Guangdong
D	Nanxiong County	1	Guangdong
E	Lechang County	1	Guangdong
F	Lian County	9	Guangdong
G	Lianshan County	2	Guangdong
H	Yangshan County	1	Guangdong
I	Fenkai County	1	Guangdong
J	Qiongshan County	3	Guangdong
K	Wuzhou City	5	Guangxi
L	Guilin	5	Guangxi
M	Liuzhou City	3	Guangxi
N	Rongshui County	1	Guangxi
O	Hechi City	2	Guangxi
P	Baise City	2	Guangxi
Q	Nanning	1	Guangxi
R	Daxun County	1	Guangxi

Map 2: **Guangdong Defence Industries before 1964**



Map 3: **Guangdong Defence Industries ca 1980**



The High Tide of Defence Industrial Planning in Guangdong, 1963–1972

The period from late 1963 to 1972 marked the high tide of defence industrial planning in Guangdong. The period started with a massive mobilization by the Third Bureau of the Second Ministry of Machine Building (the nuclear industry) to find and develop new uranium mines, and culminated with the apparent cancellation of grandiose plans by the Sixth Ministry of Machine Building (shipbuilding) for naval construction in the Central South Region in the Fourth Five-Year Plan. Between these two endpoints, Guangdong played an instrumental role in the evolution of policies towards the Third Front in all parts of China.

Uranium exploration and mining. On 11 November 1963, the Third Bureau of the Second Ministry of Machine Building convened a meeting in Guangzhou on national uranium mining geology work. The meeting was addressed by Vice-Minister Lei Rongtian and used the vocabulary of war (fighting a battle of annihilation and so on). The Ministry of Geology and Second Ministry systems were mobilized to survey, prospect and lay the ground-work for new uranium mines. Guangdong, especially the Aobei part, bordering on Human and Jiangxi, was a particular focus. Surveying and prospecting units from Xinjiang, Sichuan, Guizhou, Hunan and Yunnan joined with the already existing surveying units of the Central South region to increase greatly their activities. Between 1964 and 1970, 137.8 million *yuan* was spent on this work in Guangdong (and non-trivial amounts had been spent prior to 1964, though figures on the earlier period were not presented). By the summer of 1964, the newly expanded 209 [Geological exploration] Brigade of the Central South region was reconstituted with more than 10,000 workers and staff, including eight exploration units of about a thousand people each. For the next five years, and despite the disruptions associated with the Cultural Revolution and the demands of the Third Front in other parts of the country, they would survey, explore, prospect and undertake preliminary excavations of uranium-bearing rock strata in eight counties, with less extensive investigations elsewhere. Indeed, over the entire period from 1955 to 1970, more than 45 per cent of all Guangdong's area would be surveyed in the search for uranium. As a result of these efforts, three large, three medium and eight small uranium deposits were discovered, leading to the establishment of 11 producing mines in the late 1980s, ten with production exceeding 1,000 tons of uranium-bearing ore per year.[31] While there was local mobilization associated with the uranium exploration drive, it remained a central government directed and managed programme.

The Third Front. Barry Naughton's pathbreaking essays on the Third Front revealed to an English-language audience the monumental dimen-

31. *JGSL*, pp. 33a–33b, 34 and 540–559.

sions of China's defence industrialization from 1964 to 1972.[32] The Third Front was the product of Mao's estimation, articulated in May and June 1964, that prospects for war were growing, much of China's industry was vulnerable to a strategic bombing campaign, and that China had to mobilize to prepare for imminent attack. As a result, massive new investment was located in the Third Front, especially in Sichuan, Guizhou, Gansu, Yunnan and Hubei beginning in late 1964.[33]

At the lower levels, there was a certain amount of confusion as to what was to be done. In Guangdong, the Central South Bureau, the Guangdong Party Committee and provincial government and the Wuhan and Guangzhou Military Regions started planning on the basis of Mao's fears about the danger of war. A military industry committee was established in the Central South Bureau, placed under the Central South Economic Committee. The military industry committee had three offices, with the third office responsible for the little Third Front. Corresponding organs were established at the provincial level. Early on, it was decided that the big Third Front would be the responsibility of the centre and the little Third Front the responsibility of the Military Regions and the Party Regional Bureaus. For local officials, the Third Front involved not only military industry, but also communications, transportation, reserves of materials, wartime mobilization and other activities. Originally, the Military Regions played the leading role in forming plans, but increasingly the regional bureaus and the provinces took over planning of the little Third Front. In October 1964, Guangdong submitted a report to the centre on its plans that drew Mao's praise.

The October 1964 Guangdong plan was relatively modest in scope, but it also presented an opportunity for Guangdong and Central South officials to make an impression on the centre, and as with effective politicians and bureaucrats, to expand the resources available to their domains. Guangdong, based on the work of the Guangzhou Military Region, presented plans for defence industry construction (six factories)

32. Barry Naughton, "The Third Front: defence industrialization in the Chinese interior," *The China Quarterly*, No. 115 (September 1988), pp. 351–386, and "Industrial policy during the Cultural Revolution," in William A. Joseph *et al.* (eds.), *New Perspectives on the Cultural Revolution* (Cambridge, MA: Harvard University Press, 1991), pp. 153–181. See also Lewis and Xue, *China's Strategic Seapower*, ch. 4. As Lewis and Xue point out, what Naughton calls the Third Front should really be translated as the Third Line, but Naughton's translation seems to have stuck, and I use his term throughout this article.

33. In addition to Naughton and Lewis and Xue, see *Mao Zedong sixiang wansui* (*Long Live Mao Zedong Thought*; the version available in the West since the early 1970s) (n.p.: 1969), pp. 494–99, "Liushi niandai sanxian jianshe juece wenxian xuanzai" ("Selected documents on the 1960s Third Front construction policy"), *Dangde wenxian* (*Party Documents*), No.3 (1995) pp. 33–42; Chen Donglin, "Cong 'chi chuan yong jihua' dao 'zhanbei jihua' " ("From an eat, wear, use plan to a 'prepare for war plan' ") *Dangdai Zhongguo shi yanjiu* (*Research on Contemporary Chinese History*), hereafter *DDZGSYJ*] No. 2, (1997) pp. 65–75; "Zai beizhan xingshixia zhiding disan wunian jihua" ("Drawing up the Third Five-Year Plan under conditions of preparing for war – an excerpt from *Zhou Enlai zhuan, vol. 3.*"), *DDZGSYJ*, No. 6 (1997), pp. 62–75. The geographic dimensions of Third Front investment can be inferred from *Zhongguo guding zichan touzi tongji ziliao, 1950–1985* (*Statistical Materials on Fixed Asset Investment in China, 1950–1985*; hereafter *Guding*) (Beijing: Zhongguo tongji chubanshe, 1987), pp. 45–48.

and ancillary facilities, significantly based on existing facilities; to transfer civilian industries from major cities to the interior of the province; to build new power stations to supply the new production bases in the "3 Lians" – Lian, Lianshan and Liannan counties – and in central Hainan; to upgrade roads to these areas; to expand communications networks; to build supply warehouses and reserves to supply the daily and production needs of up to 400,000 troops and workers; to build up agricultural production bases, including establishing three small and two large state farms; and finally, to build up necessary educational and public health facilities. All told, the plan called for more than 53 million *yuan* in investment, or about 10 per cent of all investment in Guangdong in 1963.[34]

No data are available about how other Military Regions, regional Party bureaus and provinces responded to the Third Front initiative.[35] But Mao singled Guangdong out for praise, and the Guangdong report seems to have sharpened a line in Mao's thought that had been emerging since early 1964, and would continue into the Cultural Revolution. Thus, four days after Guangdong submitted its report, Mao passed it on to Liu Shaoqi, Zhou Enlai, Deng Xiaoping, Peng Zhen and PLA Chief of Staff Luo Ruiqing. Lin Biao also received a copy, and urged Mao to circulate it to all provinces. Mao had noted approvingly how mobilized Guangdong was on the Third Front, and asked [rhetorically?] whether the document should be passed on to other first and second front provinces, to have them discuss Third Front issues. They in turn were to pass on their concrete recommendations to the centre. Mao also noted that more money should be spent on the Third Front, perhaps another 1.5 billion *yuan* over the next two to three years, in what was to become the little Third Front. He concluded his cover note to other leaders with the comment, "if we don't act now, it will cause immense sorrow in the future [*xianzai bu wei, houhui wuji*]."[36]

It appears that the document was circulated to the provinces, with Mao's approving comments as well, perhaps, with his mention of additional money for defence industry construction. As a result, after October 1964, provinces displaced Military Regions as the chief planners for the little Third Front.[37] As a result, several disputes emerged now that broader patterns of co-operation across provinces within the same Mili-

34. The text of the Guangdong report is found in *JGSL*, pp. 321–327. The investment figure for 1963 is found in *Guding*, p. 46.

35. However, most of the other provincial defence industry histories mention Mao's comments on the Guangdong proposal, suggesting that for the histories of defence industrialization in those areas, Mao's response to the Guangdong memorial had a powerful impact.

36. *Jianguo yilai Mao Zedong wengao, di shiyi ce* (*Manuscripts of Mao Zedong since the Founding of the PRC, volume 11 (1964–1965*)) (Beijing: Zhongyang wenxian chubanshe, 1996), pp. 196–97.

37. *JGSL*, pp. 244–46. These pages are part of seven pages of recollections by Yu Fengchi, who was vice-director of the little Third Front Office of the Central South Bureau. On bandwagoning, see Avery Goldstein, *From Bandwagoning to Balance of Power Politics* (Stanford: Stanford University Press, 1991).

tary Region had been set aside. Each province wanted to have its own industrial die workshop or factory, as opposed to earlier plans for shared machine tool factories providing common parts and equipment for little Third Front plants in several provinces. The provinces won the argument, at the cost of efficiency, as most of these machine tool factories had little to do once Third Front factories were completed. In the particular context of Guangdong, there was also a dispute about whether defence enterprises should be built in Hainan. Those opposed argued that it would be very difficult to supply needed raw materials to Hainan during wartime conditions, and production would be very irregular at best. Those in favour argued that Hainan needed the industries to resist invasion. But no consensus was reached on this question in Guangdong and the Central South Bureau, and since the supply of materials for Hainan involved the Navy and the Air Force, ultimately, the centre was asked to settle the issue. Given that three little Third Front enterprises were set up in Hainan, the centre can be presumed to have supported building defence factories there.

By 1968, more than 700 little Third Front projects had been started nation-wide, and 800 million *yuan* was allocated for additional investment in these projects in 1968. Because of delays caused by the Cultural Revolution, Mao's original idea of three years of little Third Front construction was extended, and his 1.5 billion *yuan* price tag undoubtedly exceeded.[38] In the end, 268 little Third Front conventional ordnance factories would be built, employing 280,000 people in 1980. Ordnance projects constituted 30 per cent of capital construction funds in little Third Front core areas. In addition, they created the demand for iron and steel plants, machine tools, repair yards, electric power, communications and other projects.[39] And while aggregate figures are available for numbers of little Third Front ordnance enterprises, there are no figures for little Third Front electronics and other defence industrial sector enterprises. As discussed above, in Guangdong, there were at least ten little Third Front ordnance enterprises and three little Third Front electronics enterprises.

For being the pace setter on the Third Front, Guangdong not only received the Chairman's praise but also the four big Third Front enterprises mentioned above. Guangdong was by no means geographically located in the Third Front areas of the North-west and South-west, but by responding enthusiastically to Mao's initiative the Guangdong leadership was able to benefit from what can be seen as "pork barrel" politics. One possible reason for Guangdong to take an activist stance on the Third Front might have been the wildly fluctuating nature of investment in large and medium-sized projects in Guangdong.

38. On the little Third Front in 1967 and 1968, see *Zhonghua renmin gongheguo guomin jingji he shehui fazhan jihua da shi jiyao* (*PRC National Economic and Social Development Plan Chronicle*) (Beijing: Hongqi chubanshe, 1987), pp. 265, 271–72, and *Zhonghua renmin gongheguo jingji guanli dashiji* (*Chronology of Major Events in PRC Economic Management*) (Beijing: Zhongguo jingji chubanshe, 1986), pp. 243 and 247.

39. Chen Ping *et al.* (chief eds.), *Xin Zhongguo de jiben jianshe – guofang gongye juan* (*Capital Construction in New China – National Defence Industry Volume*) (Beijing?: Guofang gongye chubanshe, 1987), pp. 26–27.

Investment in Large and Medium Projects in Guangdong, 1957–1964[40]

1957	143.3 million *yuan*	1961	270.4 million *yuan*
1958	302.97 million *yuan*	1962	613.15 million *yuan*
1959	432.15 million *yuan*	1963	94.14 million *yuan*
1960	91.12 million *yuan*	1964	50.87 million *yuan*

While Guangdong suffered a rapid rise and abrupt decline in investment during the Great Leap Forward (along with the rest of the country), it appears to have rebounded extremely quickly from the Leap, with investment in 1961 nearly rivalling 1958, and 1962 investment exceeding Leap highs. But then Guangdong went into a second and even more severe decline in terms of investment in large and medium projects. Tao Zhu and his colleagues may have been looking for a way to bring about a more stable pattern of investment within Guangdong, in this case, by expanding the defence industry in the province.

In fact, the Guangdong report might have stimulated an almost immediate rethinking of the spatial dimensions of the Third Front. As Mao's ideas on the Third Front evolved in the summer of 1964, it had two major components: the south-west, composed of Sichuan, Guizhou, Yunnan and western portions of Hebei and Hunan, and the north-west, which included Shaanxi, Gansu, Ningxia and Qinghai, as well as the western parts of Shanxi and Henan.[41] However, by the time of the formulation of the Fourth Five-Year Plan (1971–75), the State Council used a definition of the Third Front that was south of the Great Wall and west of the Beijing–Guangzhou Railroad.[42] In short, Guangdong had become a big Third Front province, perhaps by contributing to a redefinition of what the Third Front was.

The four big Third Front projects Guangdong received were a trivial portion of the almost 2,000 large and medium enterprises and research institutes built between 1964 and 1980 as part of the Third Front policy.[43] That figure, however, appears to include civilian supporting projects, so some additional Guangdong projects, such as the Shaoguan Iron and Steel Mill, completed in 1970, or the relocation of at least four major enterprises from Guangzhou and Foshan to the Shaoguan region, might also be included.[44]

The Third Front would take on multiple dimensions in Mao's thoughts between 1964 and the height of the Cultural Revolution. From defence preparation to waging small-scale guerrilla war at the provincial level, to establishing the military power needed for lower-level Party bodies to

40. *Guangdong sheng guomin jingji he shehui fazhan tongji ziliao*, p. 198.

41. Jin Zhongji, chief ed., *Zhou Enlai zhuan, 1949–1976, xia* (*Biography of Zhou Enlai, 1949–1976, volume 2*) (Beijing: Zhongyang wenxian chubanshe, 1998), p. 811. See also "Liushi niandai san xian jianshe juece wenxian xuanzai."

42. *Gansu san xian jianshe*, p. 2. For a somewhat narrower definition, see *Zhongguo da san xian* (*China's Big Third Front*) (Zhongguo huabao chubanshe, 1998), p. 12.

43. *Zhongguo da san xian.*

44. Kuang Ji, chief ed., *Dangdai Zhongguo de guangdong, shang* (*Contemporary China's Guangdong, Volume 1*) (Beijing: Dangdai Zhongguo chubanshe, 1991), pp. 562–63, 574. See also Vogel, *One Step Ahead*, pp. 229–232.

resist the centre, to the provision of weapons of all sorts to revolutionaries throughout out the world, the idea of extensive militarization of local economies was a recurring and increasingly apocalyptic theme in Mao's thought. We will probably never know what motivated Guangdong's leaders to respond so rapidly and actively to Mao's thoughts on the Third Front. At least until the early part of the Cultural Revolution, Guangdong seems to have taken advantage of these views, and in turn, it might be argued that Guangdong's readiness to act on Mao's ideas only pushed Mao to think more radically about the process of provincial defence industrialization.[45]

Naval shipbuilding in the Fourth Five-Year Plan. Drawing on the national plan for shipbuilding for the Fourth Five-Year Plan (4FYP), cadres from the Central South office of the Sixth Ministry of Machine Building (shipbuilding), the Central South Navy Armaments office, and major Central South shipbuilding and equipping factories (including Huangpu Shipyard, Guangzhou Shipyard, the Guangzhou Radio Factory and four other factories, perhaps located in Guangxi and identified only by code numbers) met between 17 and 24 July 1970 to iron out plans for naval construction in the Central South in the coming five years. The plan called for the Central South to catch up to world shipbuilding levels and to build a large number of advanced warships. Within the plan period, the Central South was to go from copy production of type 33 submarines and other craft to trial production of new warships independently designed. These were to include nuclear submarines, as well as laying the groundwork for the production of nuclear-powered guided missile destroyers and cruisers.

The Central South was to produce 360,000 tons of ships, including 130,000 tons of warships (and 70,000 tons of naval auxiliary vessels) in the 4FYP. Thirty conventional submarines, types 33 and 35, were to be built, and great efforts extended to build one nuclear-powered submarine. Eighteen large warships were to be built, types 51 and 65, and again great efforts were to be made to build nuclear-powered destroyers and cruisers (China has yet to produce a cruiser of any sort, or any nuclear power surface warship). In addition, 109 fast attack boats of different types were to be built, among other craft. Because of these bombastic plans, by 1975 the capacity of the Guangzhou Shipyard would have to be six times larger than it was in 1966, and three times larger than in 1970. The Central South would have to undertake 34 major construction projects, costing 650 million *yuan* during the plan period (with Guangdong providing 50 million and Guangxi and Hunan 25 million each).[46]

45. On Mao's changing ideas about the Third Front and war preparation, see *JGSL*, p. 243; *History of the Chinese Communist Party: A Chronology of Events (1919–1990)* (Beijing: Foreign Languages Press, 1991), p. 318; and "Zhongguo yao chengwei shijiede binggongchang" ("China should become the world's armament factory"), *Xuexi ziliao xuyi* (*Study Materials, first supplement*) (Vol. 13 in the set of Mao materials provided by the Centre for Chinese Research Materials in the 1980s), pp. 375–77. This speech is also available in other Cultural Revolution collections of Mao's writings.

46. *JGSL*, pp. 524–534.

A year later, on the eve of Lin Biao's death, a further report from sixth Ministry offices in the Central South discussed the organization of production lines for auxiliary equipment needed for naval construction in line with Mao's calls to "establish a strong navy" and "greatly develop the shipbuilding industry." Certainly realism about production capacity and design limitations had not come about when this report was written in early September 1971.[47] The Guangdong defence industry history does not include any more documents about shipbuilding after this date, and it can only be presumed that the 4FYP for shipbuilding in the Central South came to a halt a short time after 13 September 1971, when Lin died.

Lucian Pye and others have argued that bureaucratic interests were not important in China, but that factional interests were pre-eminent. He points to the example of the Chinese Air Force, with its functional requirement for high technology weaponry, advocating "men over weapons" to show the futility of a bureaucratic interest approach to Chinese politics.[48] But the example of shipbuilding above suggests that bureaucratic interests might indeed have been served by the "Lin Biao Clique." A similar "great leap" in combat aircraft types and numbers was planned in the late 1960s by leaders associated with Lin.[49] There is no way of knowing how much was actually spent, but the two major Guangdong shipyards produced a number of the types specified during and after the plan period. While the plan was cut short, it was not totally negated. Had it continued it would have profoundly shaped industrial development in Guangdong.

Conversion

Guangdong's defence industrialization was, in most cases, not central to national efforts. Moreover, the combination of Lin Biao's fall, Sino-American rapproachement, Mao's death and Deng Xiaoping's rise to power led to a reconsideration of China's overall economic strategy, which had profound implications for defence industry nation-wide. No longer would defence industrialization be the highest priority. Making the defence industry serve national economic construction through conversion to civil uses became a watchword.

Despite reform and readjustment beginning in late 1978, defence enterprises had a mixed pattern of conversion to civilian use, with different rates of conversion and different experiences in terms of methods employed. In general, "freeing" defence enterprises from the supervisory control of the provincial national defence science technology and industry office was the last step in conversion, and a number of enter-

47. *JGSL*, pp. 535–39.

48. Lucian Pye, *The Dynamics of Chinese Politics* (Cambridge: Oelgeschlager, Gunn, and Hain Publishers, 1981), p. 86 and Fang Zhu, *Gun Barrel Politics* (Boulder: Westview Press, 1998), pp. 12–13.

49. Xie Guang (chief ed.), *Dangdai Zhongguode guofang keji shiye, shang* (*The Defence Science and Technology Endeavours of Contemporary China, volume 1*) (Beijing: Dangdai Zhongguo chubanshe, 1992), p. 86.

prises remained under its supervision in the early 1990s. The very largest enterprises in Guangdong (the two shipyards, Guangzhou Radio Factory and the uranium mines) remained in place, but began (at somewhat different times) to produce overwhelmingly for civilian use. For the Guangzhou Shipyard, civilian production became significant in the mid-1970s. For the uranium mines conversion meant exploration and development of other mineral deposits, and they have had some success with gold and silver. By the mid-1980s, the output of the shipyards and the radio factory was more than 90 per cent civilian (no information is available about the uranium mines).[50]

The little Third Front enterprises had different experiences. One, the Lechang TNT Factory (State Weimin Machinery Factory, 5625 F), was closed by 1985, as it had been an economic disaster. Many of the others were turned over to local officials, and in some cases moved from the mountains of the north to the Pearl River Delta. Some set up branch enterprises in the Delta. The electronics firms were particularly successful in moving and cloning off parts to set up new enterprises. Thus, the three little Third Front electronics firms became seven enterprises, one of which became Guangdong's first electronics joint venture.

The process of conversion to civilian production for eight of the little Third Front ordnance factories is shown in Table 3.[51] Only in 1985 did the overall output of these plants exceed their production in 1979. The process of conversion to civilian production was not as unilinear as might have been thought, as the declines in the percentage of civilian production in 1982 and 1983 demonstrate. Even as late as 1985, when defence production from these factories was undoubtedly redundant, about a quarter of their output was still defence related.

The first administrative changes occurred in 1980, when three mobilization lines for producing infantry rifles were abolished. In 1983, administrative reshuffling in Guangdong merged the provincial machinery, agricultural machinery, and defence science and technology offices as the provincial machinery office, while preserving the name of the defence science and technology office as a sub-unit. At the same time, the province established the Lingnan Industrial Company to manage local defence enterprises. Guangdong sent its first plan for restructuring local defence enterprises to COSTIND on 16 April 1984, proposing that four of the ordnance plants remain military in nature, while actively expanding civilian production. Four others should retain their military enterprise code number (*dai hao*) but should shift to civilian production. Seven months later, the centre responded, reducing to three the number of enterprises still with some defence production, but turning all the other little Third Front enterprises over to the localities, with no defence production responsibilities. As late as April 1987, the provincial defence industry office was determining that a number of the factories central to the mobilization production lines should retain their ability to produce

50. *GDSZ*, pp. 147, 150.
51. *GDSZ*, pp. 150–51.

Table 3: **Conversion of Defence Production in Eight Provincial Ordnance Factories**

Year	*Gross output value (million yuan)*	*% civilian output*
1979	27.17	28.7
1980	21.38	44.86
1981	16.29	62.86
1982	17.65	61.26
1983	20.37	57.49
1984	24.05	69.6
1985	27.61	75.8

defence products in an emergency. The slowness of administrative change was shown by the fact that Guangdong did not give ownership and control of the three now converted Hainan Island ordnance factories to Hainan until February 1990, four years after Hainan obtained provincial status. As noted earlier, even in the early 1990s eight enterprises remained under the defence industry office. Ten other electronics firms were at least partially overseen by that office, and a number of civilian explosives factories were given plan targets by the provincial defence industry office. Only in 1990 did the Guangdong finance bureau stop providing subsidies to defence enterprises, though it declared that they would be exempt from taxes during the Eighth Five-Year Plan (1991–95). Conversion had taken place, and defence procurement was drastically reduced, but the structure of a defence industrial administrative and planning system remained in place.[52]

The Impact of Defence Industrialization in Guangdong

While the material on the Guangdong defence industry provides a great deal of information, it does not give significant data on output in monetary terms. As a result, basic econometric models of economic growth cannot be applied to assess the economic impacts of defence industrialization in Guangdong. But some other, rough data are available, and an attempt is made here to assess the impact of Guangdong's defence industrialization, especially from the perspective of investment in fixed assets.

Between 1950 and 1978, total capital construction in Guangdong was slightly over 19.9 billion *yuan*. Of this, 7.25 billion, or 36 per cent of the total, was allocated to heavy industry. (Light industry received 1.3 billion, and agriculture almost 3.4 billion.)[53] There are scattered data on invest-

52. Administrative details are found in *GDSZ*, pp. 35–50.

53. Nie Li (chief ed.), *Guangdong sheng guomin jingji he shehui fazhan tongji ziliao, 1949–1988 nian (Guding zichan touzi bufen)* (*Statistical Materials on National Economic and Social Development in Guangdong Province, 1949–1988, Fixed Assets Investment Portion*, hereafter *GD Guding*) (Ningbo: Guangdong tongji ju, 1989), pp. 158–161 for aggregate figures, and pp. 93–94 for heavy and light industry and agriculture. There are minor discrepancies for aggregate totals in another table found on pp. 86–87, which I am unable to understand.

ment connected with defence industrialization (but the Guangdong defence industry volumes do not tell us what price series are used when it reports on investment figures). Thus, between 1964 and 1978, 250 million *yuan* was invested in the ordnance industry. Between 1959 and 1987, more than 400 million *yuan* was invested in the three uranium mines. Total investment in the three little Third Front electronics industries between 1969 and 1978 was 26.29 million *yuan*. Between 1958 and 1985, 120 million *yuan* was invested in the Guangzhou Shipyard and at least 110 million in the Huangpu Shipyard.[54]

Despite problems with the data, and assuming that the vast majority of investment in uranium mining and processing took place between 1964 and 1978, then approximately 775 million *yuan* was invested in Guangdong's defence industry during that period. Total investment in heavy industry was 5.04 billion *yuan*. Thus, during that period, approximately 15 per cent of all heavy industrial investment in Guangdong went directly to defence industries. This does not include other ancillary investments, both in industry and other sectors, that were necessary for the building of Guangdong's defence industry. Factoring in the uranium prospecting investment and military industry investment prior to 1964, capital construction directly related to defence probably constituted, at a minimum, 5 per cent of all investment in Guangdong between 1950 and 1978.

The scattered available data for selected years are presented in Table 4. Most of the figures are solely for the ordnance industry, but output data for 1976 and 1977 may be inclusive, though it is also possible that the nuclear industry is excluded from these totals. Workers and staff for 1971 includes the major shipyards and some other enterprises not in the conventional ordnance system. The approximate figure of defence industry output for 1976 constitutes about 1.25 per cent of all industrial output in Guangdong in 1976, and the 1977 figures marginally increases the percentage to 1.38. Defence industrial output therefore constitutes a negligible percentage of total industrial output.[55] The number of workers and staff in 22 military industrial enterprises in 1971 was about 1.3 per cent of all industrial workers and staff in Guangdong industry in 1971. However, this was 3.2 per cent of workers and staff in state-owned industry.[56] Again, the percentages are trivial numbers, yet the fact that they are generated by a small number of enterprises suggests that each enterprise was a substantial employer in Guangdong. The scattered and incomplete investment data yield somewhat higher figures: investment in

54. *GDSZ*, pp. 65 (ordnance), 135 (uranium mines), 125 (electronics) and 94–99, 104–105 (shipyards).

55. Gross output figures for Guangdong industry are found in *Quanguo ge sheng, zizhiqu, zhixiashi lishi tongji ziliao huibian, 1949–1989* (*Compendium of Historical Statistical Materials for all Provinces, Autonomous Regions, and Centrally Administered Cities*) (Zhengzhou: Zhongguo tongji chubanshe, 1990), p. 623.

56. *Guangdong sheng guomin fingji he shehui fazhan tongji ziliao, 1949–1988 nian (laodong gongzi bufen)* (*Statistical Materials on the National Economy and Social Development in Guangdong Province, 1949–1988, volume on labour and wages*) (n.p.: Guangdong tongji ju, n.d.), pp. 5 and 72.

Table 4: **Yearly figures for Guangdong Defence Industry**

Year	*Capital*	*Output*	*Labour*
1970	46.6 million *yuan* (28 little Third front projects – plan) 8.1 million *yuan* spent – 17 projects		
1971	37.7 million *yuan* spent – 17 projects	24.15 million *yuan*-5 enterprises, planned	22,575 in 22 units
1975	21.19 million *yuan* in 14 ordnance enterprises 49–75 cum.: 147.3 million *yuan* 14 ordinance enterprises	26.81 million yuan-8 ordinance units	11,498 in 14 ordnance enterprises
1976		~205 million *yuan* entire GD military industrial system	
1977		241.97 million *yuan* entire GD military industrial system (17.8% over 1976)	
1978		30.65 million *yuan* (plan – ordnance industry) 31.97 million *yuan* (actual – ordnance industry)	
1979	cum investment, ordnance industry, 1949–79, constant 1970 *yuan* – 192.6 million *yuan* cum investment, 4 big Third Front enterprises, 60.9 million *yuan* cum investment, 10 little Third Front enterprises, 51.9million *yuan*	26.7 million (plan, ordnance enterprises) 29.8 million *yuan* actual 4 big Third Front: 2.64 10 little Third Front: 27.17 million *yuan*	total: 12,812 4 big Third Front: 2,459 10 little Third Front: 8,732

Source:
JGSL, pp. 337 (28 little Third Front investment), 411 (70–71 investment figures) 376–384 (output 1971), 368 (labour 1971), 478–79 for 1975 figures, 430 for 1977 output and basis for calculating 1976 output, 497 for 1978 output, and 504–511 for 1979 figures.

17 projects in 1971 was 8.8 per cent of total investment in heavy industry in 1971, and the investment in 14 defence enterprises in 1975 was 3.6 per cent of all heavy industrial investment in that year.[57]

An additional way to try to assess the impact of defence industrialization is to return to the description of the defence industrial sector derived

57. Calculated from *GD Guding*, p. 94 and *JGSL*, pp. 411 and 478–79.

from the 1985 industrial census above. The Guangzhou and Huangpu Shipyards and the Guangzhou Radio Factory had been largely converted to civilian construction in 1985, and are listed as civilian enterprises in Volume 2 of the 1985 industrial census. Yet, it is clear that these enterprises were overwhelmingly defence factories for most of their existence. If the totals of these three large and medium enterprises are added to the totals of the already inferred 20 defence enterprises, then defence enterprises made up 3.3 per cent of the output of state-owned large and medium enterprises, 6.66 per cent of the labour, and 6.33 per cent of the capital of Guangdong's large and medium enterprises.

Guangdong's defence industrial capital construction projects constituted 7 per cent of all large and medium industrial construction projects in Guangdong between 1949 and 1980, and 8.5 per cent of all large and medium construction projects in communications and transportation.[58] Again, while the figures are not huge, they are not insignificant. Defence industrialization was certainly a part of the economic and industrial history of Guangdong under communism, but at first glance it was not the most salient part.

One last way to gauge the impact of defence industrialization on Guangdong's economy is to examine the number of large and medium state-owned enterprises involved in defence industrialization in any way from 1949 to 1985. Thus, from the Guangdong defence industry volumes, it is possible to identify either current or prior defence industrialization tasks for 44 of the 433 large and medium civilian enterprises in Guangdong in 1985. Of Guangdong's 433 civilian state-owned large and medium enterprises, eight were in raw material extraction, 32 in public utilities (water and electrical supply) 193 in light industry (food, beverage, tobacco and textiles), and the remaining 200 in heavy industry. Of the heavy industrial enterprises, 43 had or have defence industrialization programmes. In addition, the 20 defence enterprises are probably heavy industrial enterprises. Thus, 63 out of 220 heavy industrial enterprises had been involved in defence industrialization in Guangdong, and some may still have defence production responsibilities.

These comments do not include those enterprises that served to provide raw materials, semi-finished products and other inputs to the defence industry, or that supplied electric power, refined petroleum products and so on. In other words, the figures do not reflect the "demand pull" that defence industries might have had in the Guangdong economy in the Mao period. As such, the impact of defence industrialization in Guangdong is significantly, if indeterminantly, understated.

Implications

By the end of the Mao period, a defence industrial base had been built in Guangdong. At the (relatively) high technology and capital intensive

58. *GD Guding*, pp. 215–232. Note: large and medium construction projects are not the same thing as large and medium enterprises.

end were the two large shipyards, and the uranium mines and ore processing facilities. Much more numerous and standardized were the light conventional weapons factories. In between were a number of electronics firms, some of which were involved in sophisticated technological projects, such as inputs for China's ICBM programme, and a few larger conventional weapons facilities that never truly achieved their designated tasks.

In effect, Guangdong's defence industry structure resembled a dual economy. There were the small number (five or six) of large enterprises that were firmly linked into the national defence industry system. Clearly they responded to central plans and priorities and their funding presumably came overwhelmingly from the central government. They served *national* defence priorities, and their products were procured through the *national* defence system.

But in terms of numbers, the heart of the Guangdong defence economy was a system of enterprises geared for people's war. This may not have meant guerrilla war, but overwhelmingly the structure of the *local* defence economy was geared for supplying local military efforts to beat off an invading army through popular mobilization. This is clearly reflected in the types of weapons produced by the small Third Front enterprises in Guangdong – semi-automatic rifles, ammunition, land mines, grenades and other light infantry weapons – that might be widely distributed to a mobilized population. The defence mobilization production lines mirrored this pattern, as basically each prefecture/large city had its own rifle production line. Even some of the larger conventional weapons planned to be built were for local defence. The anti-aircraft weapons were for local and low-level air defence. Guangdong produced no armoured vehicles, no large calibre artillery, no missiles and no aircraft.

The electronics industry does not fall so neatly into either sector, partly because the materials on the Guangdong defence industry are perhaps more evasive here than with any other aspect of defence industry in Guangdong. This is probably because the electronics industry is the most active component of Guangdong's defence industry today. The electronics industry served both the national and the local defence economy, providing high tech instrumentation for ICBMs and satellites, and ship and airborne radar and sonar. But it also provided standard communications equipment for small infantry formations, and output of the latter probably greatly exceeded the former.

While Guangdong's defence industrial structure had a dual nature to it, it might be argued that there were in fact three tiers to China's defence industry. The first was the very high technology programmes that were highest priority and under the firm control and administration of the centre, such as the nuclear weapons programme, nuclear submarines and ballistic missiles. The second was large-scale conventional weaponry and electronics, composed of the aviation industry, smaller missiles and rockets, defence electronics, large-scale naval ships, armoured vehicles, and so on. Finally, the little Third Front made up the lowest level, providing light infantry weapons and perhaps tactical communications equipment for local defence.

Guangdong was not really a part of the top tier, and while the uranium mines served the nuclear weapons programme, it was not in this area of mining and preliminary ore processing that scarce scientific and technical personnel were overwhelmingly concentrated. In the national scheme of things, it can be argued that the top tier suffered fewer cut-backs in spending and priority than the other two tiers in the reform period.

Guangdong was clearly a part of the second and third tiers. It appears that the shipyards and at least some of the electronics firms have been able to shift to civilian production, while retaining some potential or actual defence production. This is a result of the nature of the industries they are in, the reform programme and the open door. Arguably, at the national level, shipbuilding, aviation and electronics have been far more successful at defence conversion than large-scale ordnance factories.

Finally, the little Third Front was least successful at conversion, both in Guangdong and nationally. The enterprises associated with this lowest tier of the defence industrial system were numerous, and therefore excessively redundant even at the provincial level; they produced standardized weapons and lacked connections to research and development systems (not that these were terribly innovative in any event); and they were located in remote areas. All these factors led these enterprises to have very little potential for successful conversion, though it appears that Guangdong's Third Front electronics factories, through a great deal of reorganization, have been able to convert.

It would be hard to argue that Guangdong played an indispensable role in Chinese national security and in the political economy of China's military industrial complex. Clearly, the Guangdong shipyards were necessary (but arguably not irreplaceable) for the PLA Southern Fleet. Given the relatively low concentration of uranium in ore-bearing strata throughout China, Guangdong's uranium mines may have played a helpful role, but again, not an indispensable one. Obviously, redundancy of production should be a hallmark of defence industrial systems, but how significantly Guangdong contributed to this cannot be answered. In short, Guangdong's contribution to the national defence industrial system is hard to assess, perhaps harder to assess than that to the local defence industrial system. Even with the latter and the little Third Front, it would be hard to argue that its existence was a decisive consideration in deterring an invasion of Guangdong (which could only have come from the United States and Taiwan, given Guangdong's location; an American invasion of China was not actively considered during the period that China and Guangdong were preparing for it).

There remains much that is unknown about the local defence industrial system, such as the diffusion of production techniques, intra-provincial contributions to the diffusion of skills and local development in remote regions of the province. It would also be important to know how much time top leaders of the province spent on defence industrial issues. While there might have been a bias against discussing Zhao Ziyang's role when the volume was prepared, even safer figures like Tao Zhu are rarely mentioned. How did provincial defence industrialization relate to local

PLA deployments, training and activities? How might defence industrialization have affected Party–military interactions at the provincial level? Were Third Front weapons distributed to the militia? Was there active, or more active, militia training as a consequence of Third Front weapons production? In short, what was the *political* economy of local defence industrialization in Guangdong?

This article has tried to show that defence industrialization was a significant but not vital segment of Guangdong's development during the Mao period and beyond. Guangdong ranked in the bottom half of all provincial-level units in terms of the size of its defence industries. Given its exposed location, it is in some ways surprising there was as much defence industrialization as there was. Some can only be explained by geography and geology: its coastal location and the presence of uranium. (Ironically, it may be Guangdong's exposed location and the extent of its openness to the outside that explain why defence electronics now appear to be the core of its defence industry).[59]

While Guangdong leaders appear to have been entrepreneurial in having the centre authorize big Third Front enterprises in the province, most of Guangdong's local defence industry was responsive to national trends, and seemingly, at the level of the little Third Front, it may have received the basic or average number of ordnance factories for people's war that other provinces received. Nevertheless, Guangdong's defence industry constituted a fairly substantial share of all investment resources in the province, especially between 1964 and 1978. If this was true for Guangdong, it is likely to be true for most other provincial-level units. Moreover, for provincial-level units with larger-scale conventional weapons enterprises, the importance of defence industrialization to the provincial economy was probably significantly greater.

59. On the role of openness and the development of China's electronics industry, see Barry Naughton (ed.), *The China Circle* (Washington, D.C.: The Brookings Institution, 1997).