

China's Defence Industrial Base in 1985

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Abstract

This essay assesses various dimensions of China's defence industrial enterprises. It argues that the defence industrial system should be divided into two tiers: tier one, composed of weapons and equipment producers for the military, and tier two, composed of "civilian" industrial enterprises that provided critical inputs for tier one enterprises, and which in national emergencies could be mobilized to produce weapons themselves. In 1985, there were 1,158 tier one defence enterprises and 827 tier two enterprises among China's 8,285 large- and medium-scale enterprises. Additional information is provided on defence enterprise shares of the economy at the provincial and the national levels, on enterprise distribution by industrial sector, and on when enterprises were built. The article attempts to estimate the total number of workers, output value and fixed assets of the defence industrial sector, and their weight in the national economy.

Keywords: defence industry; industry; large- and medium-scale enterprises; provincial economies; labour force; Mao period; China

For most of the Mao years, building a powerful national defence was a core goal of the Chinese state. A strong military and a large, comprehensive defence industrial base to sustain it were the operationalization of this goal. In the 1950s, many of the turnkey plants that were imported were defence industrial factories. With the break from the Soviets, and Mao's fear of war with one or both superpowers, the Third Front policy of defence industrialization was at the forefront of China's grand strategy. In the post-Mao years, and particularly in the 1980s, defence modernization was the lowest ranked of the four modernizations, but with the fall of the Soviet Union and the onset of unipolarity in the international system, China's national defence – both a strong People's Liberation Army (PLA) and a defence industrial base capable of producing high quality and increasingly state-of-the-art weapons systems – returned as a fundamental goal of the party-state system.

This essay focuses on the defence industrial base – the factories producing arms, equipment and key industrial inputs for the PLA – and attempts to present a snapshot of that base in 1985. An unparalleled wealth of data exists for 1985, making it the best available year for analysis. The snapshot shows that

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of China's 8,285 large- and medium-scale (LM) industrial enterprises, 1,158 or 14 per cent were or had been core defence industrial enterprises: these will be called tier one defence enterprises. At least 827 additional LM enterprises had non-trivial and sometimes very significant defence responsibilities: these will be called tier two defence enterprises. Thus, at least 24 per cent of China's most significant industrial enterprises in 1985 were contributing, or had the capability to contribute, to the arming and provisioning of the PLA. Additional details concerning these factories – where they were located, their shares of provincial economies, which industrial sectors they were in, when they were started and how much of industrial economy they accounted for – are provided below.

The fact that 24 per cent of all major enterprises (and one-third of all heavy industrial enterprises) in the PRC were or had been involved in China's defence industrial system hints at the significance of these empirical data. In fact, these data are important for multiple reasons. First, a very substantial proportion of China's industrial economy was involved in the production of materials for the PLA and, at times, for foreign states. As in the case of economic reforms in the Soviet Union under Gorbachev, the fact that so many state-owned factories were involved with the defence sector constrained (and perhaps contributed causally to) the way reform proceeded in China. Second and relatedly, even at a time of relative security for the PRC, the defence industrial sector was fundamentally important for China's national security. While China could and did significantly participate in the international arms market, most PLA equipment came from China's defence industrial sector. The defence industrial system simply could not be ignored, and its problems posed major challenges to political and military leaders and to national security. Yet China lacked the capital, technology and trained personnel to modernize its defence industrial complex rapidly in the mid-1980s. How to make the defence industrial system more efficient, innovative and technologically advanced were fundamental issues that connected economic planning and administration with national security affairs. Third, for a number of provincial-level economies, the defence industrial sector was extraordinarily large. For the leaders of these provinces, including Hu Jintao in Guizhou and Wen Jiabao in Gansu, the defence industrial system was the core element of the economy and, to some extent, local society. These enterprises, even when under central government administration, structured and constrained provincial reform and growth opportunities to different degrees throughout China; it might reasonably be assumed that they affected the perspectives of officials like Hu and Wen. Fourth, as noted, since 1949 a central task of Chinese state building under the Communist Party was creating a modern defence industry. Apart from a hiatus during the 1980s, building the foundations of a strong national defence (and its concomitant industrial basis) has been a central task of the Chinese leadership and state. The data presented in this essay document the extent of that particular state-building commitment up to 1985. Finally, the data in this essay can provide a baseline for examining the evolution and

development of the Chinese defence industrial system going backward and forward in time from 1985.

This essay draws on, and contributes to, the extensive literature on China's military modernization and reform. Many have written on China's defence industrial system, but have usually focused on its administration – how the defence industrial economy is organized, which ministries or corporations supervise factories, whether the heads of these organizations are civilians or military figures – and on its ability to modernize and innovate (or to be converted to civilian production).¹ Others have written about particular defence technology sectors or grand strategic defence industrial policies.² These studies have greatly advanced understanding of the PRC's defence industrial system. But few of them have adopted the perspective of this essay and attempted to measure and assess the defence industrial system at the level of its core constitutive elements – the factories that produce China's weaponry and equipment for its military. By providing a reasonable approximation of the size, scale and significance of China's defence factories, this essay offers additional avenues to approach many important issues including China's national security and grand strategies, the defence economy and the overall economy, state-owned enterprise reform issues, and the political process that confronted those handling defence industrial problems.

The first section of this essay briefly discusses how this database of defence industrial factories was compiled and organized, and addresses some of the assumptions behind the data collection and presentation. The second section presents quantitative data on the scale of the defence industrial economy in terms of national aggregates, provincial dimensions, sectoral composition and chronological development. The final section attempts to estimate the total number of labourers employed in the defence industrial system, the gross value of industrial output of that sector and the total quantity of fixed capital utilized by defence factories.

Data Issues

This study is based on data collected on 1,158 tier one and 827 tier two defence enterprises in China. These data were culled from many sources, including provincial and municipal defence industry, shipbuilding, aviation, electronics, military, machinery, and science and technology gazetteer volumes; ordinance industry yearbooks; industrial directories; volumes on the 1985 and 1995 industrial censuses; semi-official histories of defence industrial sectors; provincial encyclopedias; yearbooks; statistical yearbooks; catalogues of civilian products

1 Major works with significant discussions of the defence industrial system include Jammes 1983; Jencks 1982, ch. 6; Shambaugh 1983; Shambaugh 2002, ch. 6; Frieman 1989; Frieman 1993; Cheung 2009, ch. 2 and 3; and Medeiros et al. 2005. Major works on defence conversion are Berthelemy and Deger 1995; Folta 1992; and Brommelhorster and Frankenstein, eds. 1997.

2 The works of Lewis and Xue, 1988, 1994, and 2006, and Naughton, 1988 are particularly relevant here.

produced by defence factories; and histories of specific defence factories.³ Where possible, I compiled the name of the factory, its *daihao* 代号 (code number), its location (province, county, city), its 1985 gross value of industrial output, its labour force at the end of 1985, its fixed capital, its supervisory department or agency (PLA, ordinance, etc.), its start date and its two-digit industrial sector according to the 1985 census classification scheme. Data is not complete for all enterprises, as will be seen below. In addition, I looked for firm information that a factory was a defence industrial producer or for explicit mention that it contributed to defence industrial production.

This essay uses 1985 as its base year for the following reasons. China undertook an industrial census in that year, which generated substantial amounts of data. At least as important, many other sources also use 1985 as their reporting year, yielding more all-around data than for 1995 or 2005, when China also undertook industrial censuses. Finally, China's reforms, especially in industry, were still in a relatively preliminary state. 1985 gives a better sense of the burden that this core element of the state-planned sector imposed on the economy.

I focus on large- and medium-scale enterprises, partly for convenience and, more importantly, because of their significance in the economy. Volume one of the 1985 Industrial Census contains aggregate data on LM enterprises. Volume two lists 7,592 individual LM enterprises, with output, employment and fixed asset data. An introductory note to that volume states that defence enterprises and joint venture enterprises were excluded. However, this claim is highly problematic.⁴ Many tier one defence enterprises (481) are among those included in volume two. Moreover, the differing definitions of "large and medium" enterprise used by different sectors add an additional complication to the analysis, in that it is often not self-evident whether a potential defence enterprise reaches the threshold of large or medium scale. Thus, except in cases where we have definitive statements (and data) about all LM enterprises in a province, there is a degree of uncertainty attached to all of what follows.

In 1985, LM enterprises constituted less than 2 per cent of all Chinese enterprises, but they accounted for 49 per cent of the gross value of industrial output, 33.4 per cent of all workers and staff, and 65.7 per cent of all fixed assets.⁵ These

3 To list all the sources used to compile this database would require many pages. I will cite the sources that are most germane in references below.

4 *Zhonghua renmin gongheguo 1985 nian gongye pucha ziliao* 1988, vol. 2, editorial note, says that it lists data on 7,588 enterprises by 40 industrial sectors, as well as 513 joint ventures (n.p.). Volume one of the census materials frequently reports that there were 8,285 LM enterprises (for example, p. 122). However, I entered all enterprises in the volume two into spreadsheets and discovered that the publication miscounted. It contains data on 7,592 enterprises. Thus one could conclude that there were 693 LM defence factories in China. Despite what the editorial note says, this would be a false conclusion. First, more than half of all defence enterprises are not listed in the volume. One systematic deviation is that LM gold (and silver) mines are not listed in volume two. Second and more significantly, many defence factories are listed among the 7,592 enterprises in volume two.

5 In 1980, before the reforms had really taken off, LM enterprises provided 56% of all output, 37.9% of all workers and staff, and 70.3% of all fixed assets. See *Zhonghua renmin gongheguo 1985 nian gongye pucha ziliao* 1988, vol. 3, 80–84 and vol. 1, 24.

enterprises were the commanding heights of the Chinese industrial economy, though their position was undergoing dynamic transformation. As noted, the demarcation line between large-, medium- and small-scale enterprises varies by sector. Thus, if data are lacking on enterprise sectors, output, labour and capital, definitive determinations on whether enterprises were large or medium scale are impossible. If incomplete data suggested an enterprise was comparable in size to enterprises more definitively identified as large or medium scale, I tentatively characterized the enterprise as falling into that category.⁶

Large- and medium-scale enterprises were the core of the state socialist system under Mao; they lay at the heart of state planning, and defence industrial production required economies of scale, elaborate quality control procedures and numerous security protocols and personnel. All of these factors make it likely that most defence products come from LM enterprises.⁷ However, some tier one and tier two defence enterprises fell below the LM scale threshold, particularly in the electronics sector. Reform flourished in the agricultural, private, collective and foreign sectors of the economy, but “growing out of the plan” reflected the key role still played by the state sector in the industrial economy in the 1980s.⁸

It is also assumed that defence enterprises are state-owned enterprises. For tier one factories this seems largely self-evident. The Party-state would not trust non-state sectors to manage core defence production. For tier two factories the rationale would be as follows: many of the tier two enterprises embarked on defence-related production when the non-state sector was virtually nonexistent (especially for much of the Third Front/Cultural Revolution period). In the case of explosives (which can be created from fertilizer production plants), the issue is much more complex. Small rural fertilizer factories were key elements of rural industrialization in the late 1960s and 1970s and were generally owned or managed by communes or production brigades – collective or non-state enterprises nominally. How many fertilizer factories could (and did) produce explosives and how many were in the non-state sector are unknown. But during the 1966–1976 period, it is not clear that there was any meaningful distinction between state owned and non-state owned. Thus, the assumption here is that these enterprises were in effect state owned. Moreover, of the 8,285 LM industrial enterprises in China in 1985, 7,946 (96 per cent) were state owned.

6 In addition, a number of volumes from the 1995 industrial census were also consulted. While an enterprise categorized in 1995 as large or medium scale is not authoritative for 1985, in the absence of other information it was another source for tentatively counting an enterprise of this size in 1985. 1995 Industrial Census materials consulted included: China Statistics Consultants (BJ) Limited 1997; *Zhonghua renmin gongheguo gongye qiye jiben gaikuang: huaxue gongye juan* 1997; *Zhonghua renmin gongheguo gongye qiye jiben gaikuang: jixie gongye juan* 1997; and *Zhonghua renmin gongheguo gongye qiye jiben gaikuang: yejin gongye juan: yuse yejin gongye fence* 1997.

7 Unfortunately, the definition of what constitutes large and medium differs from sector to sector. In the 1985 Industrial Census, there were 39 two digit sectors. A large defence enterprise in sector 34 (machine building) would be a small enterprise in ferrous metal processing. Compare State Honggang Machinery Factory (in the missile industry) with Baotou Dongfeng Steel Mill in *Neimenggu zizhiqu di er ci quanguo gongye pucha ziliao huibian, di yi ce* 1987, 115 and 238.

8 Naughton 1995.

Finally, I divided the defence industrial sector into tier one and tier two enterprises. Tier one defence industry enterprises were those then under military leadership, under the PLA's general logistics department or the Commission on Science and Technology for National Defence (COSTIND), or those explicitly created to provide weapons and equipment for the PLA.⁹ In the 1985 Industrial Census, there were ten enterprises under COSTIND, 369 under the PLA general logistics department, 143 in the aeronautics industry, 460 in the ordinance industry, 61 in the nuclear industry and 94 in missiles and space. I assume all these enterprises were tier one defence enterprise (though not all of them were large and medium scale). In addition, some fraction of the 185 enterprises in the shipbuilding industry and 2,356 enterprises in the electronics industry were also tier one.¹⁰

However, defence-related production also came from at least three different kinds of activities in non-defence sectors, all of which involved tier two defence enterprises. Producing weapons and PLA equipment was not their core mission, but their output contributed to weapons production and defence planning. The first of these three kinds of tier two enterprises were what is referred to in Chinese materials as *junshi peitao* 军事配套. The source that uses this term translates it as "war industry conveyance production," but it has a meaning of inputs necessary to the functioning of the overall (military or defence) product.¹¹ Data is very limited here, but to give an example, in 1985, 34 enterprises in Sichuan's general machinery sector were producing 78.4 million yuan of necessary inputs for defence production (down substantially both in terms of enterprises and output from previous years). Moreover, the scope of *peitao* production could be very large. Thus, the No. 2 Heavy Machinery Factory in Deyang 德阳, Sichuan, had a complete production line for large-calibre artillery and another for aircraft forgings.¹² How broadly such production is counted (what exactly constitutes *peitao* production¹³) is far from clear, and the discussion and data from Sichuan are the most extensive uncovered. A second part of civilian industry related to defence is defence industrial mobilization production lines. Here, civilian

9 There may be a tendency to assume that many PLA enterprises were a product of the reform period itself, a response to declining budgets. But even prior to reform there was a substantial number of PLA enterprises, some of which already existed at the time of the founding of the PRC, if not before. Many of these served standard logistical functions, and included factories producing military uniforms and shoes, printing presses for the military system, navy shipyards, air force aircraft repair facilities, military electronics, tank and truck repair facilities. Of the PLA enterprises for which I have data as LM enterprises, very few were started in the reform period. On the general issue of PLA enterprises in the 1980s and 1990s, see Mulvenon 2001.

10 Numbers of enterprises by sector are found in *Zhonghua renmin gongheguo 1985 nian gongye pucha ziliao*, vol. 3 122–125.

11 *Sichuan sheng zhi: jixie gongye zhi 1994*, table of contents, 4 and 13.

12 *Ibid.* 327, and on No. 2 Heavy Machinery Factory, *Zhongguo qiye gaikuang 1988*, vol. 6, 216.

13 This raises an issue of judgment as to when a particular threshold of significance is reached. At some level, the electricity or fresh water supplied to a defence enterprise is essential to the creation of a defence product. But in the analysis of available sources, a product from a non-military enterprise that is explicitly stated as being used by the defence industrial sector will be seen as a *peitao* product. Thus, gasoline used by military trucks is not a *peitao* product, but aviation fuel or lubricants for military aircraft are *peitao* products.

enterprises were charged with building a piece of military equipment or, within a network of civilian enterprises, components for military equipment that were then assembled in a designated civilian enterprise. Additional allocations of personnel, machinery and capital went to create these capacities. Again, the data here are spotty. Finally, a third group of enterprises – particularly those producing explosives but also those in other areas – was put under the management and supervision of provincial defence industrial offices. Where data identified an enterprise in one of these three categories, the enterprise was counted as a tier two defence enterprise. On data limitations concerning tier two enterprises, see below.

In 1985, there were 1,158 tier one LM defence enterprises (or 14 per cent of the total LM enterprises in China) and at least 827 tier two defence-related enterprises, or an additional 10 per cent of all LM factories (likely a significant understatement of their numbers due to limited data). The tier one total gives a focused view of the direct weapons and equipment producers for the PLA. Tiers one and two together give a broader sense of the extent of the reach of the military-defence-industrial complex in the overall economy. More details about these factories are provided below.

Data

Table 1 presents information about defence industry enterprises by province. Complete lists of LM enterprises are available for Liaoning, Yunnan, Inner Mongolia and Tibet for 1985; a list for 1986 exists for Hebei; and sources provide the number of LM defence enterprises for Guizhou and Jiangxi in 1985.¹⁴ Provincial-level and municipal gazetteers for defence industries exist for Liaoning, Hebei, Shanxi, Shaanxi, Gansu, Jiangsu, Anhui, Guangdong, Guangxi, Baotou 包头, Chongqing, Shenyang, Harbin, Handan 邯郸 (Hebei), Jiaozuo 焦作 (Henan), and in a somewhat different format for Beijing and Shanghai,¹⁵ greatly adding to confidence about the data from those areas.

14 There were four LM enterprises in Tibet according to *Zhonghua renmin gongheguo 1985 nian gongye pucha ziliao* 1988, vol. 1; all four are listed in volume two of the 1985 Industrial Census, and none appear to be defence enterprises. Liaoning LM enterprises are from *Liaoning sheng gongye pucha qiye minglu*, 1986; for Inner Mongolia, see *Neimenggu zizhiqu di er ci quanguo gongye pucha ziliao huibian*, di yi ce 1987; for Yunnan, *Di er ci quanguo gongye pucha Yunnan sheng da zhong xing gongye pucha jiben qingkuang* 1987. A Hebei list for 1986 is found in *Hebei jingji tongji nianjian 1987* 1988, 408–431. Guizhou numbers are found in *Guizhou gongye*, 1949–1989 1989, 97. Jiangxi numbers in *Jiangxi gongye* 1988, 425, 449. Note that in 1985 Hainan and Chongqing were administratively subordinate to Guangdong and Sichuan provinces, respectively.

15 *Liaoning sheng guofang keji gongye zhi (1881–1985)* 1992; *Dangdai Beijing guofang gongye*, 1990; *Hebei sheng zhi*, di 34 juan: *guofang keji gongye zhi* 1995; *Shanxi tongzhi*, di 18 juan: *junshi gongye zhi*, 1997; *Shanxi jungong jianshe*, 1993; *Gansu sheng zhi*, di 43 juan: *junshi gongye zhi* 1992; *Gansu san xian jianshe* 1993; *Jiangsu sheng zhi: junshi gongye zhi* 2000; *Anhui sheng zhi: junshi gongye zhi* 1996; *Guangxi guofang gongye* 1996; *Guangdong sheng zhi: junshi gongye zhi* 1995; *Guangdong jungong ziliao (2) 1949–1987* 1990?; and *Shanghai guofang keji gongye wushi nian* 2005. City and prefectural volumes are *Baotou shi zhi: guofang gongye juan* 1995; *Shenyang shi zhi di liu juan: junshi gongye* 1992; *Chongqing shi zhi: guofang keji gongye juan* 1996; *Harbin shi zhi: junshi, junshi gongye* 1994; *Handan*

Table 1: Provincial Defence Industrial Enterprises

Province	Total LM enterprises*	Defence LM enterprises (tier 1)	Tier 1 as % of all LM enterprises	Defence related LM (tier 2)	Tier 2 as % of all LM enterprises	Tiers 1 and 2 total	Tiers 1 and 2 as % of all LM enterprises
Anhui	205	33	16.1	4	2.0	37	18.0
Beijing	391	51	13.0	56	14.3	107	27.4
Fujian	149	14	9.4	4	2.7	18	12.1
Gansu	160	34	21.3	38	23.8	72	45.0
Guangdong	453	31	6.8	36	7.9	67	14.8
Guangxi	211	16	7.6	29	13.7	45	21.3
Guizhou	175	83	47.4	8	4.6	91	52.0
Hebei	310	41	13.2	33	10.6	74	23.9
Heilongjiang	336	26	7.7	28	8.3	54	16.1
Henan	306	41	13.4	17	5.6	58	19.0
Hubei	367	69	18.8	25	6.8	94	25.6
Hunan	301	50	16.6	19	6.3	69	22.9
Jiangsu	602	49	8.1	33	5.5	82	13.6
Jiangxi	226	54	23.9	7	3.1	61	27.0
Jilin	263	31	11.8	14	5.3	45	17.1
Liaoning	690	69	10.0	68	9.9	137	19.9
Neimenggu	127	8	6.3	3	2.4	11	8.7
Ningxia	38	3	7.9	5	13.2	8	21.1
Qinghai	48	10	20.8	6	12.5	16	33.3
Shaanxi	289	91	31.5	24	8.3	115	39.8
Shandong	451	26	5.8	28	6.2	54	12.0
Shanghai	570	61	10.7	176	30.9	237	41.6
Shanxi	223	52	23.3	13	5.8	65	29.1
Sichuan	587	137	23.3	97	16.5	234	39.9
Tianjin	300	22	7.3	27	9.0	49	16.3
Tibet	4	0	0.0	0	0.0	0	0.0
Xinjiang	89	14	15.7	4	4.5	18	20.2
Yunnan	197	28	14.2	15	7.6	43	21.8
Zhejiang	217	14	6.5	10	4.6	24	11.1
Total	8285	1158	14.0	827	10.0	1985	24.0

Sources

* *Zhonghua renmin gongheguo 1985 nian gongye pucha ziliao* 1988, vol. 1.

Thus, for 15 provincial-level units, the numbers of LM tier one defence enterprises presented in [Table 1](#) are either exact or very close. The numbers of tier one defence enterprises in Xinjiang, Qinghai, Ningxia and Fujian are also close to being exact, given the small total number of LM factories in those provinces.

In 11 provincial-level units, 15 per cent or more of all LM enterprises were tier one defence plants, and in another seven, they were between 10 and 15 per cent of all such enterprises. For those provinces where more than 20 per cent of all LM enterprises were tier one defence enterprises, it can well be argued that defence industrialization was the central story of their industrial development up to 1985, leaving legacies that persist to this day. Thus, for Guizhou, Shaanxi, Jiangxi, Shanxi, Sichuan, Gansu and Qinghai, defence industrialization and overall industrialization were deeply interrelated. Most provincial-level units with fewer than 10 per cent of their LM enterprises in the tier one sector were coastal provinces.

The tier two totals on [Table 1](#) likely grossly understate the numbers of LM enterprises that made non-trivial or non-ordinary contributions to overall defence industrialization. This is for several major reasons. First, very limited data on defence mobilization production lines are available, with basically complete listings of involved enterprises available only for Gansu, Guangdong, Guangxi, Shanghai and Handan city. To illustrate the undercounting, consider the following: in 1980, there were 33 defence mobilization lines in Hebei that involved 356 enterprises (and in earlier periods, 500–600 enterprises were involved). In Handan, 61 enterprises were part of defence mobilization and 20 were LM enterprises. In all of Handan, there were a total of 34 LM enterprises (two tier one defence enterprises). Thus in Handan, 60 per cent of all LM plants were in the tier one and tier two sectors of defence industrialization. Handan had five mobilization lines operating in 1980, but there were also five lines in Zhangjiakou 张家口, Shijiazhuang 石家庄, and Tangshan 唐山, with smaller numbers in other major (and not so major) cities in Hebei. Handan may have had an exceptionally large number of enterprises involved in defence industrialization, but it would seem reasonable to conclude that roughly comparable numbers of LM enterprises in Zhangjiakou, Shijiazhuang and Tangshan were also tier two enterprises. It also might be reasonable to guesstimate that perhaps 100 LM plants in Hebei were part of defence mobilization lines, or about a third of all factories.¹⁶ Hebei,

footnote continued

shi guofang gongye zhi 1991; *Jiaozuo junshi gongye zhi: 1945–1985* 1989; *Shijiazhuang shi zhi: guofang gongye*, 1990; and *Hebei sheng Hengshui diqu guofang gongye zhi (1970–1988)* 1988?

- 16 Numbers of lines and locations of lines in Hebei from *Hebei sheng zhi, di 34 juan: guofang keji gongye juan* 1995, 158. Numbers of LM enterprises in mobilization lines in Hebei derived from *Handan shi guofang gongye zhi* 1991; *Zhonghua renmin gongheguo 1985 nian gongye pucha ziliao* 1988, vol. 2, and *Hebei jingji tongji nianjian* 1988. Ironically, the two tier one defence enterprises in Handan, State Factory 368 Factory, Hanguang Machinery Factory and PLA Factory 2672, are not discussed in the Handan

as the hinterland for the defence of Beijing, may (again) have had an exceptionally large number of mobilization lines, but nationally 190 lines still existed in 1986, after earlier rounds of readjustment and closures.¹⁷ A similar tale probably could be told about *peitao* enterprises. Only a small number of provincial- and municipal-level units report extensively on *peitao* enterprises.¹⁸ In sum, considerably more than 827 LM enterprises were likely to have been part of China's defence industrial complex.

The available data show that tier one and tier two defence enterprises constituted one-third or more of all LM enterprises in six provincial-level units, between one-fifth and one-third of all LM enterprises in ten provincial-level units, and between 15 and 20 percent of all LM enterprises in another six provinces. Tier one and tier two LM defence enterprises constituted at least 10 per cent of all provincial-level units except for Tibet and Inner Mongolia.

Table 2 reports the available information on labour, output and fixed assets from the dataset of 1,158 tier one enterprises by provincial-level unit. Data exist for employment in 734 of the tier one defence enterprises, output for 675 enterprises, and fixed assets for 595 enterprises. A very significant proportion of all this data comes from the 481 tier one enterprises listed in volume two of the 1985 Industrial Census. In general, volume two lists more electronics, naval and missile-related enterprises than nuclear, ordnance, PLA general logistics department and aircraft enterprises. How this might bias the presentation of data is not clear, but in general in the 1980s, electronics and ship building were much more successful in converting to civilian production than the ordnance, aircraft and nuclear industries. Based on this incomplete data, in nine provinces more than 10 per cent of the industrial workforce in LM enterprises were in tier one defence enterprises; in six provincial-level units more than 10 per cent of the output of LM enterprises came from tier one factories; and in two provinces, more than 10 per cent of the fixed assets in LM enterprises were in tier one units (with data on fixed assets for only half of the total number of tier one enterprises).

An additional way to look at the defence industrial base in the Chinese economy is to examine the sectors in which LM enterprises were categorized in the 1985 Industrial Census. There were 40 large (one through 39) sectors in the 1985 census. There are substantial numbers of these enterprises for which

footnote continued

defence volume, perhaps because the book was published by the Ordinance Industry Press, and Hanguang Machinery, which makes naval artillery among other things, is under the control of the China State Shipbuilding Corporation, and Factory 2672 is under the PLA.

- 17 *Zhongguo bingqi gongye nianjian, 1986–1990* 1991, 156. It is not clear whether the 190 number is of total number of lines, or just lines producing ordnance products. There were mobilization lines in non-ordnance products, but the vast majority of lines appear to have been in ordnance products.
- 18 Materials from *Dangdai Beijing guofang gongye* 1990; *Shanghai guofang keji gongye wushi nian* 2005; *Harbin shi zhi: junshi, junshi gongye* 1994; and *Chongqing shi zhi: guofang keji gongye juan* 1996, are strong here. *Sichuan sheng zhi: jixie gongye zhi* 1994 is particularly valuable. *Shanghai guofang keji gongye wushi nian* 2005 includes an additional 104 tier two enterprises not found through other sources.

Table 2: Tier One Large- and Medium-Scale Enterprise Data

Province	No. of enterprises with data	Labour		No. of enterprises with data	Output		No. of enterprises with data	Fixed Assets	
		As % of all enterprise workers	As % of all LM workers		As % of all enterprise output	As % of all LM output		As % of all enterprise fixed assets	As % of all enterprise fixed assets
Anhui	33 (33)	2.3	7.4	19	0.9	2.0	33	3.2	5.1
Beijing	41 (51)	5.6	10.5	41	4.0	6.1	38	5.1	6.4
Fujian	5 (14)	0.6	3.2	5	1.0	3.4	4	0.6	1.5
Gansu	23 (34)	5.9	10.7	21	4.8	6.6	20	4.4	5.3
Guangdong	14 (31)	0.8	3.9	12	2.0	5.4	10	1.2	2.5
Guangxi	16 (16)	2.3	7.9	16	1.8	4.4	16	2.7	5.4
Guizhou	77 (83)	13.7	28.9	44	7.5	11.7	44	12.7	16.7
Hebei	9 (41)	0.6	1.8	9	0.7	1.6	6	0.5	0.7
Heilongjiang	14 (26)	2.5	5.5	13	2.3	3.6	6	0.4	0.5
Henan	23 (41)	2.0	5.9	21	1.9	3.9	20	3.4	5.1
Hubei	45 (69)	2.9	9.1	41	2.8	5.3	33	3.7	5.5
Hunan	19 (50)	2.2	7.2	16	1.8	4.0	11	1.6	2.9
Jiangsu	34 (49)	1.3	6.9	35	2.1	6.4	32	3.3	6.9
Jiangxi	41 (54)	3.5	11.3	41	9.4	20.7	30	4.2	7.4
Jilin	23 (31)	2.4	6.6	23	2.0	3.8	16	1.9	2.6
Liaoning	40 (69)	3.2	7.6	40	3.4	5.3	38	4.2	5.4
Neimenggu	8 (8)	4.2	10.6	8	7.2	14.4	8	6.3	9.3

Ningxia	0 (3)	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Qinghai	6 (10)	3.9	9.3	6	3.4	7.4	6	6.2	9.8
Shaanxi	46 (91)	8.2	17.2	46	10.2	16.3	35	8.1	11.2
Shandong	6 (26)	0.2	0.6	6	0.2	0.6	5	0.2	0.4
Shanghai	46 (63)	3.3	8.6	40	2.7	4.9	41	3.6	5.0
Shanxi	28 (52)	4.5	10.6	28	5.7	10.6	16	1.6	2.2
Sichuan	82 (137)	5.8	16.0	81	6.7	13.2	74	6.1	9.1
Tianjin	18 (22)	2.1	5.1	18	4.3	7.4	18	2.2	3.0
Tibet	0 (0)	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Xinjiang	4 (14)	0.9	2.5	12	1.2	2.4	3	0.4	0.7
Yunnan	28 (28)	4.6	13.3	28	3.6	6.7	28	2.9	4.7
Zhejiang	5 (14)	0.1	1.2	5	0.1	0.4	4	0.2	0.7
Total/ Average	734 (1158)	2.7	8.2	675	2.9	5.9	595	3.1	4.8

Note:

Numbers in parentheses are total number of tier one enterprises in the database. That number is the same for labour, output and fixed assets.

Table 3: Large- and Medium-Scale Defence Enterprises by Industrial Sectors

Industry	Total	Defence tier 1	Defence related tier 2	Tier 1 as % total	Tier 1 & 2 % total
1 Coal mining	69		1		1.4
2 Crude oil and natural gas production	15		1		6.7
3 Ferrous metal mining	21		1		4.8
4 Non-ferrous metal mining	97	21	2	21.6	23.7
5 Building materials and non-metal materials mining	77				
6 Salt production	33	2		6.1	6.1
7 Industrial forestry	110				
8 Fresh water provision	105		1		1.0
9 Food products	644	1	5	0.2	0.9
10 Beverages	156	1		0.6	0.6
11 Tobacco	90				
12 Fodder	2				
13 Textiles	815	3	26	0.4	3.6
14 Tailoring	25	17		68.0	68.0
15 Leather, fur and other animal products	37	4	3	10.8	18.9
16 Wood and other agricultural industrial products	75		5		6.7
17 Furniture	10				
18 Paper and paper products	184		5		2.7
19 Printing and publishing	114	8	2	7.0	8.8
20 Cultural and physical education products	14				
21 Products used for art	12				
22 Power supply and distribution	480		10		2.1
23 Petroleum processing	39		15		38.5
24 Coke, coal gas and other coal processing	46		1		2.2
25 Chemical products	573	33	72	5.8	18.3
26 Pharmaceuticals	149	1	1	0.7	1.3
27 Chemical fibres	48		4		8.3
28 Rubber products	128	3	22	2.3	19.5
29 Plastic products	130	1	15	0.8	12.3
30 Building materials and non-metal materials products	432	3	32	0.7	8.1
31 Ferrous metal processing	128	1	44	0.8	35.2
32 Non-ferrous metal processing	117	5	27	4.3	27.4
33 Metal products	120	4	14	3.3	15.0
34 Machinery	1855	265	286	14.3	29.7
35 Transportation equipment	499	84	66	16.8	30.1
36 Electrical machinery and materials	305	18	80	5.9	32.1
37 Electronics	367	206	44	56.1	68.1
38 Instruments and meters	159	58	37	36.5	59.7

Continued

Table 3: Continued

Industry	Total	Defence tier 1	Defence related tier 2	Tier 1 as % total	Tier 1 & 2 % total
39 Other	5	1	1	20.0	40.0
Total	8285	740	823		
Percentage		8.9	10		19
Total sector 22 to 38 percentage	5575	682	770		
		12.2	26		13.4
Total sector 23 to 38 percentage	5095	682	744		28.3
		13.6	28.4		
Percentage sectors 22 to 38 of 1042 defence enterprises (740 known, and 402 likely by sector)		18.7	32.5		
Percentage sectors 22 to 38 of 1042 defence enterprises (740 known, and 402 likely by sector)		20.8	35.4		

definitive sector information is unknown (about 400), and these are omitted in Table 3.¹⁹

Not surprisingly, most tier one defence enterprises are in heavy industrial sectors (23–38), with the highest numbers of defence enterprises concentrated in the machinery and electronics sectors, followed by transportation equipment and instruments and meters. The 740 known tier one enterprises account for 13.4 per cent of all large- and medium-scale heavy industrial enterprises, and the 1,442 tier one and two enterprises account for 28.3 per cent of all large and medium-scale heavy industry. Assuming that most of the 400 or so tier one enterprises

19 Table 3 includes tier one defence enterprises listed among the 7,592 enterprises in *Zhonghua renmin gongheguo 1985 nian gongye pucha ziliao 1988*, vol. 2. From the lists of enterprises and census materials for Fujian, *Fujian sheng di er ci quanguo gongye pucha ziliao huibian: da zhong xing ji sanzi qiye gaikuang, 1987*. This source was not used earlier when listing numbers of enterprises by province because it has a different total of LM enterprises than *Zhonghua renmin gongheguo 1985 nian gongye pucha ziliao 1988*, vol. 1, and it includes enterprises not listed in vol. 2 while excluding others. For Inner Mongolia, see *Neimenggu zizhiqu di er ci quanguo gongye pucha ziliao huibian, di yi ce 1987*; for Hebei, *Hebei jingji tongji nianjian 1987 1988*, 408–431, Liaoning, *Liaoning sheng gongye pucha qiye minglu 1986*; and Yunnan, *Di er ci quanguo gongye pucha Yunnan sheng da zhong xing gongye pucha jiben qingkuang 1987*, provide listings and orderings that allow one to assign sectors with complete or 99% confidence. *Zhongguo zhongyao jingji shili paixu yaolan 1991* contains ranked lists of enterprises by a number of criteria from 1989 data using the 39 sectors in the 1985 Industrial Census. A number of unlisted enterprises were found here (and I assumed that the enterprises did not change sectors between 1985 and 1989). I also concluded from this source and the others mentioned above that all uranium mines were sector 2; nuclear enrichment and processing plants were sector 32; shipyards, aircraft producers and aircraft engine producers were sector 35. *Dangdai Hubei gongye: qiye juan 1988*, has an extensive, but not complete list of enterprises by sector. I have also “guesstimated” the sectors of enterprises where definitive information is not available. In perhaps half of the cases, the guesstimates are probably accurate, but in many others they are much closer to guesses based on nothing more than the name of the enterprise. Of major sectors, 27 were in chemicals, 300 in machinery, 43 in transportation equipment, 16 in electronics and 36 in instruments. These guesstimates are not included on table 3.

for which sectoral data are unavailable are overwhelmingly heavy industry enterprises (92.2 per cent of the tier one enterprises in [table 3](#) are), then it is highly probable that tier one enterprises in the heavy industrial sectors exceed 20 per cent of all LM heavy industrial enterprises, with a very large proportion of the remaining heavy industrial enterprises in tier two. Yet, perhaps the most surprising, if trivial, finding is that the sector with the highest tier one defence concentration is the tailoring sector, dominated by PLA enterprises making uniforms and other related clothing and apparel, though this is a very small segment of the overall economy.

Even though we lack sectoral categories for some 400 enterprises, it is clear that defence enterprises constituted a very significant proportion of producers' goods industries. These were the sectors at the heart of state socialist economic systems and the beneficiaries of state priorities. At the very least, 14 per cent of all machine-building enterprises (the largest industrial sector in China) were tier one defence enterprises, but the actual percentage – if full and accurate counts of enterprises were available – could well be double that, with even more in tier two. Much of the story of metallurgy, machine building, transportation equipment, electronics, and instruments and meters industries in China is intimately linked with defence industrialization. That such a large component of heavy industry was so deeply involved in defence production is also a significant part of the story of why China needed economic reform.

A final dimension charting China's defence industrial system is when its enterprises came on line or when they started regular, serial production. These start dates give an indication of leadership priorities with regard to resource allocation issues, national security threats and grand strategy. These data are a very rough guide, though perhaps the best available to date. The most useful information would reveal when decision makers decided to build a new defence plant, or when ground was broken to build the enterprise, but that information is known only in a relatively small number of cases. There are further complications with the start date information as well. Industrial census data report when an enterprise entered regular production, but a factory could have started out as a non-defence enterprise and been transferred to defence industrial production. To take two very important cases: State Factory 436 (Jiangnan 江南 Shipyard in Shanghai) began production in 1865, and State Factory 211 (Shoudu 首都 Machinery Factory in Beijing) started production in 1938. But certainly Jiangnan was not producing naval warships for the PRC in 1865, and Shoudu Machinery was not producing missiles in 1938 (and if it were, it would have been for the Japanese). Politically induced disruptions – especially the Great Leap Forward, its catastrophic aftermath and the Cultural Revolution – prolonged construction times in many cases by years. Many defence factories were never completed and some that were completed never entered regular production. Other enterprises were engaged in “trial production” for extended periods (in some cases, years) before they entered regular production. It is far from clear that sources other than the 1985 Industrial Census are using the regular

Table 4: Start Date of Large- and Medium-Scale Defence Industrial Enterprises

Year	Tier 1	Tier 2	Total started	Tier 1 as % started
Pre-1949	49	229	1495	3.3
1949	24	27	254	9.4
1950	12	18	194	6.2
1951	23	21	198	11.6
1952	13	37	274	4.7
1953	11	21	168	6.5
1954	5	11	174	2.9
1955	4	13	101	4.0
1956	20	43	421	4.8
1957	13	18	191	6.8
1958	42	94	696	6.0
1959	25	47	420	6.0
1960	22	32	244	9.0
1961	6	1	81	7.4
1962	17	12	114	14.9
1963	18	3	64	28.1
1964	17	7	103	16.5
1965	85	31	247	34.4
1966	95	36	339	28.0
1967	34	6	124	27.4
1968	25	10	98	25.5
1969	71	24	212	33.5
1970	162	28	472	34.3
1971	65	12	221	29.4
1972	32	9	163	19.6
1973	19	7	132	14.4
1974	19	3	93	20.4
1975	34	5	113	30.1
1976	20	0	91	22.0
1977	14	4	73	19.2
1978	11	2	65	16.9
1979	14	4	93	15.1
1980	21	1	77	27.3
1981	5	0	78	6.4
1982	7	2	85	8.2
1983	5	2	63	7.9
1984	4	2	71	5.6
1985	1	1	73	1.4
Total	1063	823	8175	

production start date. There are many inconsistencies among various sources on start dates even for the same enterprise. Finally, in very few cases do we know when tier two enterprises began to engage in defence-related production. Thus, the starting dates presented here provide little or no real information about the defence industrial system and are provided for the sake of comprehensiveness, if nothing else.

Particularly striking from Table 4 is the finding that tier one LM defence enterprises entering regular production between 1962 and 1980 were never less

than one-seventh of all LM enterprises starting production, and in ten of those 19 years, they were more than a quarter of all LM enterprises that entered regular production.²⁰ Defence industrialization was clearly at the heart of the Chinese economy during these years.

Between 1949 and 1964, there was relatively steady progress in the construction of tier one defence plants, with an average of 17 coming into production per year. A substantial number of these factories were Soviet-designed and aided, and almost all were producing Soviet weapons systems. During the high point of the Third Front period (1965–1972), more than half of all tier one defence enterprises for which there is data came on line (560): 67 per year. After 1972, the pace of new factories coming into production slackened dramatically, particularly in the 1980s.

We might infer that China built the foundations of basic defence industrialization relatively steadily in the 1949 to 1964 period, with small numbers of enterprises coming on line in the mid-1950s, due to the time it took to build the Soviet turnkey factories and the slowdown in the aftermath of the Great Leap Forward crisis. Along with the plants inherited from the pre-1949 period, these were the core defence factories, including nearly all of the largest and most important factories in almost all branches. The break with the Soviets and the threat of war with first the US and then the USSR led to huge investment in defence industrialization between 1964 and 1972, when massive numbers of enterprises were built. But except for the nuclear weapons program, most of these plants were not the core of the defence industrial system, and were concentrated in interior provinces which, in some cases, had little or no prior history of defence industrialization. Many of the plants that came on line after 1972 reflected the slowing down of investment (and capital construction) after the Third Front high tide.

The pattern of tier two starting dates needs little elaboration. Many mobilization lines were set up during the Korean War, in the early 1960s and during the Third Front. Explicitly, mobilization lines drew on existing enterprises, so it is no surprise that many tier two enterprises are older than tier one enterprises (405 of 823 tier two plants were constructed between 1949 and 1964, with 229 built before 1949). Many key *peitao* factories – in metallurgy and machine tools especially – came from Soviet-designed factories from the 1950s, if not before. And when special products were needed for the defence sector, they were produced in China's most advanced factories, particularly in older industrial bases like Shanghai or Liaoning.

20 Data for tier one and tier two starting dates come from the defence industry data base. Starting dates for all enterprises comes from the 7,592 enterprises listed in *Zhonghua renmin gongheguo 1985 nian gongye pucha ziliao* 1988, vol. 2 plus the starting dates of tier one enterprises that do not appear in that source. Data is missing for at least 50 enterprises, and as noted the number of tier one enterprises is not definitive.

Estimating the Dimensions of the Defence Industrial System

Clearly the defence industrial economy was a very substantial element of the overall Chinese economy in 1985. This was still true despite stagnant or declining defence spending through most of the 1980s and a reduction in the size of the PLA that began in 1985. Other things being equal, a smaller PLA requires fewer weapons and equipment from the defence industrial base. But how substantial an element of the overall economy was it? In the following section I address this and explore what might be a reasonable estimate of its output, labour force and fixed assets.

China's defence industry used state set prices in accounting for fixed assets and its output. The noted student of the Soviet/Russian defence industrial system, Clifford Gaddy, argues that as a consequence, the "value" of output and fixed assets is essentially meaningless. They tell us nothing about scarcity values, and unless we have access to the state set prices for particular weapons systems and how many of these weapons were produced, it is extraordinarily difficult to try to figure out a "market" price, for example, of a Chinese tank. Assessing the value of fixed assets would be at least as difficult. Consequently, Gaddy states that what really matters and is comparable are the number of workers in defence plants. Numbers of workers are more comparable units than are products valued in arbitrarily determined prices.²¹ This view might be reasonable for the Soviet Union when there was no labour surplus. But in China there was a labour surplus, and up to the mid-1980s not all that much concern about state enterprise profitability. It is unclear that labourers are as significant an indicator in the Chinese case as Gaddy argues for the Soviet case. Nonetheless, I proceed as if it were, and first attempt to determine the workers in the defence industrial sector, and more speculatively, defence industrial output and fixed assets in the defence industry.

From [Table 2](#), we have numbers of workers and staff for 734 of 1,158 tier one defence enterprises, or 63.4 per cent of all tier one enterprises. Those 734 factories employed 1,815,072 people. We can extrapolate from these two figures (I will call this the extrapolation method). If 63.4 per cent of all tier one enterprises employed 1.81 million people, then all 1,158 tier one enterprises would employ 2.863 million workers and staff. This is likely to overstate the number of workers and staff. The database contains employment figures for most shipyards and large ordinance factories and some large aircraft factories. Of the missing labour data, most are likely to come from smaller (all within the LM category) enterprises. Whether adding the number of workers in small-scale tier one defence enterprises would make up for this is impossible to determine, but I assume it does, at least for now.

A second way to estimate tier one defence workers yields 2.703 million people in these enterprises. This results from taking the total numbers of workers in LM enterprises, subtracting the total number of workers from the 7,592 LM

21 Gaddy 1996, especially 9–14.

enterprises in volume two of the census. This result provides the missing data for the 693 enterprises not listed in volume two. This missing data is added to the totals for tier one enterprises that are included in volume two. (I call this the summation method.) This slightly overstates the actual number of workers in tier one enterprises because it is the product of 1,174 enterprises, yet I have only identified 1,158 tier one enterprises.

From the above, tier one LM enterprises employed approximately 2.6 to 2.8 million workers, or 11.8 to 12.7 per cent of all workers in LM enterprises and 3.9 to 4.2 per cent of all industrial workers. Perhaps the percentage of total workers would increase by several tenths if we were able to include small tier one enterprises, which clearly existed, but the scales of which are largely unknown.

Repeating the above procedures for output yields the following results. Using the extrapolation method from the database, the gross value of industrial output from tier one LM enterprises was 39.3 billion yuan. For the summation method, the total was 31.4 billion yuan. These figures represent between 8.2 and 9.9 per cent of the output of LM enterprises, and 4 to 4.8 per cent of all enterprises in China.

For fixed assets, the extrapolation method yields 42.2 billion yuan in fixed assets, and the summation method produces 47.9 billion in fixed assets. This is the only case where the summation method yields a higher result than the extrapolation method. This may be due to the lack of data about nuclear weapons-related factories, which may have very large fixed assets. These two figures represent between 9.3 and 10.5 per cent of fixed assets in LM firms, and between 6.1 and 6.9 per cent of all fixed assets in all industrial firms.

The tier one defence industrial system thus employed about 4 per cent of all industrial workers, produced about 4.5 per cent of all industrial output, and utilized about 6.5 per cent of all fixed assets. For all LM enterprises, this tier roughly constituted a tenth of all workers, output and fixed assets.

Estimating the role and impact of tier one enterprises in the economy is much easier than trying to do so for tier two enterprises. As noted, we lack extensive data on tier two enterprises, so the 827 factories which have been identified are an unknown fraction of total tier two enterprises. There is reasonably complete data on Gansu, Guangdong, Guangxi and Shanghai for tier two LM enterprises. In Gansu, they were nearly 24 per cent of all such enterprises, and in Guangdong, they were about 8 per cent, for Guangxi, they were over 13 per cent, and in Shanghai, over 30 per cent. For other provincial units where the data is relatively good (Beijing, Sichuan, Qinghai and Ningxia) tier two LM factories were about 12 per cent or more of all LM plants. Arbitrarily, then, I will assume that tier two enterprises are 15 per cent of all LM enterprises in the country, or 1,243 enterprises, 416 more than in the database. From the database, I calculated the average numbers of workers, output and fixed assets for each tier two enterprise, and multiplied that number by 1,243. Using that method, 1,243 tier two enterprises would hypothetically employ 5.69 million workers, produce 127 billion yuan of

output, and have 128 billion yuan in fixed assets. The key issue is how much of each one of these figures should be attributed to defence production.

There is very little solid data on which to develop a method for estimating tier two quantities. Some of the data comes from Sichuan, the province with the largest number of tier one and second largest number of tier two enterprises. Data from the machinery and electrical sector state that 34 enterprises in 1985 produced 78.4 million yuan in output. Cumulatively from 1961 to 1985, tier two enterprises in the mechano-electrical sector produced 2.4 billion yuan of defence output. Of this, 180 million yuan came from defence mobilization production lines (or 7.5 per cent); the rest from *peitao* enterprises.²² It is likely, given the international environment in 1985, that mobilization lines were producing little or no output in that year. The 78 million yuan *peitao* production in the mechano-electrical sector was 0.21 per cent of all of Sichuan's industrial output (after deducting estimated tier 1 production), and 0.46 per cent of the output of all LM factories in Sichuan. Other data on *peitao* production comes from the steel industry. Dalian Steel Mill employed 702 workers and staff in the defence aspects of its production and research (5.1 per cent of a total of 13,758). It produced 12,653 tons of steel for defence uses. Daye 大冶 Steel Mill in Hubei produced 25,573 tons of steel for defence industries, and the Chengdu Seamless Steel Pipe Factory produced 24,451 tons of steel.²³ From national data we can estimate an average price of steel per ton of about 510 yuan, and use this to determine how much of the output of these steel plants went to the defence sector.²⁴ From this, 1.8 per cent of Dalian Steel's output went to the defence sector, and 3.6 per cent each of Daye's and Chengdu Seamless's output went to the defence sector. Altogether, they produced steel worth about 32 million yuan for defence industries in 1985. Including these three mills, there were 44 known tier two LM steel mills. If we assume that tier two steel mills provided about 2.5 per cent of their output to the defence sector, they produced steel worth about 590 million yuan for the military. The steel sector accounts for more than 0.7 per cent of the value of the 827 known tier two enterprises. From the Sichuan information about tier two production, and given the likelihood that Sichuan would have a very large quantity of *peitao* enterprises and production, we might suggest that of the remaining tier two enterprises (after subtracting the steel sector), 0.2 per cent of their output from the extrapolated totals for 1,243 enterprises, about 1.9 billion yuan, would go to the defence sector.

22 *Sichuan sheng zhi: jixie gongye zhi* 1994, 327.

23 See *Dalian gangchang yejin jungong shi (1946–1985)* 1988, 318 and 361; *Daye gangchang yejin jungong shi (1949–1985)* 1989, 391; and *Chengdu wufeng gang guan chang yejin jungong shi (1964–1985)* 1987, 28.

24 Calculated from 1985 national output of steel and finished steel products, found in *Quanguo ge sheng, zizhiq, zhixiashi lishi tongji ziliao huibian (1949–1989)* 1990, 18, and the total output value of the steel industry in 1980 constant prices, found in *Zhonghua renmin gongheguo 1985 nian gongye pucha ziliao* 1988, vol. 3, 18. The actual price per ton was 507.3 yuan, but for ease of calculation I used 510 yuan per ton.

Arguably, somewhat higher percentages of labour and fixed assets should be attributed to the defence sector than is the case with output. As noted, it is likely that there was no output from defence industrial mobilization lines in 1985. But many of those lines remained in existence, and had dedicated personnel and fixed assets ready for mobilization in the event of emergency. In theory, the people and machinery designated for defence production should be counted as part of the defence industrial base, even if they were not actually producing defence products in 1985. Other than the figure for numbers of defence workers at Dalian Steel, and a cumulative figure of 50,720 people employed in the defence component of Shanghai's metallurgical sector from 1957 to 1985, there are no other data on tier two employees working on defence production in 1985.²⁵ We might guess that 1–2 per cent of the employees in tier two steel mills were dedicated to defence production, and that 0.1–0.2 per cent of the remaining tier two employees were predominantly defence oriented. This in ball park terms would represent about 57 to 114,000 workers and staff when these percentages are multiplied by the hypothesized tier two worker totals. Unfortunately, we have no data on which to even begin to base a reasonable estimate for fixed assets, so I will simply suggest that perhaps somewhere between 0.5 and 1 per cent of all fixed assets of tier two enterprises were dedicated for military use. This yields about 1.25 billion to 2.5 billion yuan in fixed assets.

If these estimates have any resemblance to the real situation, the figures deduced do not add very substantially to those for tier one enterprises. The defence industrial sector may account for 4 to 4.4 per cent of all industrial labour, 4.2 to 5.2 per cent of all industrial output, and 6.3 to 7.3 per cent of all industrial fixed assets in 1985, and 12.4 to 13.4 per cent of all labour, 8.6 to 10.7 per cent of all output, and 9.6 to 11.1 per cent of all fixed assets in LM industrial enterprises. Certainly, tier two production was much greater in the mid-1960s and early 1970s. In 1973, tier two defence production in the mechano-electrical sector in Sichuan was about 1.5 per cent of all provincial industrial output.²⁶ But with defence conversion, PLA force reduction, declining procurement budgets and a more secure China, it appears that the tier two defence sector played little role in the overall defence industrial system and in national industry in 1985.

Conclusion

This essay has presented data on dimensions of China's defence industrial system in 1985. In terms of numbers of enterprises, the defence industrial sector was a very substantial component of all large- and medium-scale enterprises, especially in heavy industrial and state-owned sectors of the economy. For particular provinces, especially in the interior, defence industries were a very large proportion

25 *Shanghai shi yejin gongye ju yejin jun gong shi (1949–1985)* 1988, 395.

26 Calculated from *Sichuan sheng zhi: jixie gongye zhi* 1994 and *Quanguo ge sheng, zizhiqu, zhixishi lishi tongji ziliao huibian (1949–1989)* 1990, 704.

of their overall industrial sectors, and the building of a defence industrial base was a substantial proportion of all national industrial investment and construction in the period from 1964 to 1980. There are huge margins for error in all these estimates. That said, defence enterprises likely accounted for about 10–13 per cent of workers, output and assets in LM industrial enterprises, and between 4 per cent and 7.3 per cent of labour, output and fixed assets for all industry, with almost all of this coming from tier one defence industrial enterprises. Tier two enterprises appear to have played a relatively small role in the overall defence industrial system, and their defence industrial dimensions were a fairly trivial portion of national industrial totals.

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(Note: For books where there is a dedicated editorial group with the same name as the book in question, I omit the editorial committee name.)

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