

# ESTIMATING THE ARMS SALES OF CHINESE COMPANIES

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## I. Introduction

China has invested considerably in the modernization of its arms industry since the 1960s, particularly since 1999.<sup>1</sup> One aim of this has been to become self-reliant in the production of advanced weapons and technologies for its armed forces, motivated by China's security assessments and its modernization goals of 2020, 2035 and 2049.<sup>2</sup> The rise in Chinese arms exports and the increased variety of the types of weapon exported suggest that the country's state-owned arms industry is already at the forefront of many production sectors.<sup>3</sup> However, due to a lack of transparency, the value of Chinese companies' arms sales has been either unknown or based on unreliable estimates. For this reason, the SIPRI Top 100—an annual list of the world's 100 largest arms-producing and military services companies—has never included Chinese companies.<sup>4</sup> This means that Chinese companies cannot be compared to other major arms-producing and military services companies (or 'arms companies' for short).

Earlier research on the Chinese arms industry has been predominantly qualitative. Only a few studies have tried to quantify company arms sales and their financial value.<sup>5</sup> Most of the focus has remained on weapon types, the challenges faced by China in the global arms market, its military-industrial

<sup>1</sup> Initiatives include the 2006–20 Medium- and Long-Term National Defence Science and Technology Development Plan. Chinese State Administration for Science, Technology and Industry for National Defence, '国防科技工业中长期科学和技术发展规划纲要颁布' [Outline of the Medium- and Long-Term National Defence Science and Technology Development Plan], 28 Apr. 2007; and Li, J., '国防科工局表态首次确认“国防科技工业 2025”' [The National Defence Science and Industry Bureau confirms for the first time 'National Defence Technology Industry 2025'], China National Radio, 19 June 2015.

<sup>2</sup> Saunders, P. C., 'The rebalance to Asia: US–China relations and regional security', Strategic Forum no. 281, Institute for National Strategic Studies, Aug. 2013, pp. 3–4; and Kissinger, H. A., 'The future of US–Chinese relations: Conflict is a choice, not a necessity', *Foreign Affairs*, vol. 91, no. 2 (Mar./Apr. 2012); and Boyd, H., 'China's army modernisation: Progress, rhetoric and reality', Military Balance Blog, International Institute for Strategic Studies, 21 Aug. 2019.

<sup>3</sup> Bitzinger, R. A. et al., 'Locating China's place in the global defense economy', ed. T. Cheung, *Forging China's Military Might: A New Framework for Assessing Innovation* (Johns Hopkins University Press: Baltimore, MD, 2014), pp. 169–212.

<sup>4</sup> SIPRI Arms Industry Database, <<https://www.sipri.org/databases/armsindustry>>.

<sup>5</sup> Cheung, T. (ed.), 'The rise of the Chinese defense economy: Innovation potential, industrial performance, and regional comparisons', Study of Innovation and Technology in China (SITC) Research Briefs Series 1, Sep. 2010; Mehta, A., 'Chinese firms bump down Western companies on Top 100 list', *Defense News*, 22 July 2019; and Surry, E., 'An estimate of the value of Chinese arms production', Paper presented at the 11th Annual Conference on Economics and Security, University of the West of England, 5–7 July 2007.

## SUMMARY

● Quantitative research on the finances of the Chinese arms industry has been limited by the scarcity of available data. This scoping study to estimate the financial value of the arms sales of companies in the Chinese arms industry—using a new methodology—found information on four companies: Aviation Industry Corporation of China (AVIC), China Electronics Technology Group Corporation (CETC), China North Industries Group Corporation (NORINCO) and China South Industries Group Corporation (CSGC). These four companies cover three main sectors of conventional arms production: aerospace, electronics and land systems.

The estimates suggest that China is the second-largest arms producer in the world, behind the United States and ahead of Russia. All four of the profiled companies would be ranked among the 20 largest arms-producing and military services companies globally in 2017, with three—AVIC, NORINCO and CETC—in the top 10. The new methodology improves the understanding of the structure, size and evolution of the global arms industry.

**Box 1. Definition of arms and military services sales**

Arms and military services sales (arms sales for short) are defined by SIPRI as sales of military goods and services to military customers, including both sales for domestic procurement and sales for export.

Military goods and services are those that are designed specifically for military purposes and the technologies related to such goods and services. Military goods are military-specific equipment and do not include general-purpose goods, such as oil, electricity, office computers, uniforms and boots.

Military services are also military-specific. They include technical services, such as information technology, maintenance, repair and overhaul, and operational support; services related to the operation of the armed forces, such as intelligence, training, logistics and facilities management; and armed security in conflict zones. They do not include the peacetime provision of purely civilian services, such as healthcare, cleaning, catering and transportation, but supply services to operationally deployed forces are included.

Arms companies are companies with arms sales. Most companies are diversified and produce for both the military and civilian markets. In some cases, the data on arms sales reflects only what a company considers to be the defence share of its total sales. In other cases, SIPRI uses the figure for the total sales of a 'defence' division, although the division may also have some unspecified civil sales.

When a company does not report a sales figure for a defence division or similar entity, arms sales are sometimes estimated by SIPRI. Such estimates are based on data on contract awards, information on the company's current arms production and military services programmes, and figures provided by company officials in media or other reports.

*Source:* SIPRI Arms Industry Database, 'Sources and methods', <<https://www.sipri.org/databases/armsindustry/sources-and-methods>>.

strategies over time, and the link between its military modernization and arms industry reform.<sup>6</sup> However, the amount of available data has increased, making it possible to develop reasonably reliable estimates of the value of arms sales by the major Chinese arms companies. This has provided a new incentive in the research and policy communities to improve understanding of the Chinese arms industry. An interesting example is a 2019 publication by Lucie Béraud-Sudreau and Meia Nouwens that provides estimates of military-related sales for eight Chinese arms companies based on a methodology specifically developed for this purpose.<sup>7</sup>

One of SIPRI's missions has always been the provision of impartial and authoritative data on aspects of armament and disarmament through its databases on arms transfers, the arms industry and military expenditure.<sup>8</sup> For the SIPRI Arms Industry Database in particular, the purpose is to analyse the development and restructuring of the global arms industry as the security environment changes. This assessment would be incomplete without information about Chinese arms companies.

The aim of this paper is thus to prepare the ground for a full estimate of the arms sales of the Chinese arms industry by estimating arms sales data for at least one company in each of the main sectors of conventional arms

<sup>6</sup> Bitzinger, R. A. and Popescu, N. (eds), *Defence Industries in Russia and China: Players and Strategies*, Issue Report no. 38 (EU Institute for Security Studies: Paris, Dec. 2017); Cheung, T., Anderson, E. and Yang, F., 'Chinese defense industry reforms and their implications for US-China military technological competition', Study of Innovation and Technology in China (SITC) Research Briefs Series 9, no. 2017-4, Jan. 2017; and Medeiros, E. S. et al., *A New Direction for China's Defense Industry* (Rand Corporation: Santa Monica, CA, 2005).

<sup>7</sup> Béraud-Sudreau, L. and Nouwens, M., 'Weighing giants: Taking stock of the expansion of China's defence industry', *Defence and Peace Economics*, published online 27 June 2019.

<sup>8</sup> SIPRI Arms Transfers Database, <<https://www.sipri.org/databases/armstransfers>>; SIPRI Arms Industry Database (note 4); and SIPRI Military Expenditure Database, <<https://www.sipri.org/databases/milex>>.



production—aerospace, electronics, land systems and shipbuilding—for the period 2015–17. This will serve as a scoping study for fully quantifying the arms sales of the major companies in the Chinese arms industry.

This paper builds on and complements the contribution of Béraud-Sudreau and Nouwens to estimate the arms sales of Chinese companies using an alternative methodology.<sup>9</sup> It continues (in section II) by presenting an overview of China’s major arms companies and the methodology for estimating their arms sales (see box 1 for a definition). It then (in section III) compares the arms sales of Chinese arms companies with the companies in the SIPRI Top 100. Two robustness checks of this paper’s methodology follow (in section IV). First is a comparison of the arms sales estimated here with those of Béraud-Sudreau and Nouwens. The second check is to contextualize the arms sales data by comparing it with SIPRI’s data on Chinese military expenditure and arms transfers. The paper closes by offering some conclusions (in section V).

## II. Arms sales estimates for Chinese companies

### Overview

China’s arms industry primarily consists of 10 major arms companies (i.e. parent companies) and one research institute (see table 1).<sup>10</sup> To get a clear image of the financial scale of the industry, seven companies were selected for examination here, in most cases the largest company in its sector (based on the company’s known production activities): Aviation Industry Corporation of China (AVIC), the country’s largest aircraft producer; China Aerospace Science and Industry Corporation (CASIC), China’s main missile and space systems producer; China Electronics Technology Group Corporation (CETC), the leading producer of electronics and components for military goods (e.g. radars, software); China North Industries Group Corporation (NORINCO) and China South Industries Group Corporation (CSGC), China’s leading makers of land systems; and China Shipbuilding Industry Corporation (CSIC) and China State Shipbuilding Corporation (CSSC), the major shipbuilding companies.

Credible financial information was found for four of these companies—AVIC, CETC, NORINCO and CSGC and—covering the three sectors of aerospace, electronics and land systems. Estimated arms sales for these four companies cover the years 2015–17. Insufficient publicly available information was found for CASIC, CSIC and CSSC to make a reliable estimate of their arms sales.

***Credible financial information was found for four companies—AVIC, NORINCO, CSGC and CETC, which cover three sectors: aerospace, land systems and electronics***

<sup>9</sup> Nouwens, M. and Béraud-Sudreau, L., ‘Global defence-industry league: Where is China’, Military Balance Blog, International Institute for Strategic Studies, 28 Aug. 2018.

<sup>10</sup> This corresponds to the lists identified by Béraud-Sudreau and Nouwens (note 7); and Bitzinger, R. A., ‘Reforming China’s defense industry’, *Journal of Strategic Studies*, vol. 39, nos 5–6 (2016), pp. 762–89.

**Table 1.** Major Chinese arms-producing and military services companies

Arms production sector	Company name	Key military goods and services
Aerospace	Aero Engine Corporation of China (AECC)	Aircraft engines
	Aviation Industry Corporation of China (AVIC)	Aircraft and avionics
	China Aerospace Science and Industry Corporation (CASIC)	Missiles and space systems
	China Aerospace Science and Technology Corporation (CASC)	Missiles, space systems and unmanned aerial vehicles
Electronics	China Electronics Technology Group Corporation (CETC)	Military sonar, radar, electronic warfare systems, command, control, communications, computer, intelligence, surveillance and reconnaissance (C4ISR) systems (land, sea and air), information infrastructure
Land systems	China North Industries Group Corporation (NORINCO)	Armoured vehicles, artillery, guided weapons, ammunition, air defence systems, small arms
	China South Industries Group Corporation (CSGC)	Armoured vehicles, small arms
Nuclear	China Academy of Engineering Physics (CAEP)	Nuclear weapons
	China National Nuclear Corporation (CNNC)	Nuclear power, nuclear fuel
Shipbuilding <sup>a</sup>	China Shipbuilding Industry Corporation (CSIC)	Surface ships, submarines, naval weapons, naval electronics
	China State Shipbuilding Corporation (CSSC)	Surface ships and technical support

Notes: This list is based on official public information on arms industry corporations (军工集团) provided by the Chinese State Administration for Science, Technology and Industry for National Defence (SASTIND). SASTIND lists a 12th arms corporation, the China Electronics Corporation (CEC). However, CEC focuses on non-military cybersecurity equipment and services. Thus, CEC is not an arms company according to SIPRI’s definition. The 10 companies were created in 1999 by the division into 2 of each of the 5 original state-owned arms industry enterprises: AVIC, China Aerospace Corporation (CAC), CNNC, CSSC and Northern Chinese Industries Corporation (NCIC). In addition to these major arms companies, there are also hundreds of subsidiaries that belong to these corporations or parent companies.

<sup>a</sup>In 2019 CSIC and CSSC merged to form a single shipbuilding company, the China State Shipbuilding Corporation Ltd. This paper focuses on data for 2015–17, when the 2 companies were separate.

Sources: Chinese State Administration for Science, Technology and Industry for National Defence, ‘军工集团公司’ [Arms industry corporations], retrieved 17 Dec. 2019; CNNC, ‘主营业务’ [Main business], retrieved 17 Dec. 2019; CASC, ‘主营业务’ [Main business], retrieved 17 Dec. 2019; CASIC, ‘Aerospace defense’, retrieved 17 Dec. 2019; AVIC, ‘Military aviation and defense’, retrieved 17 Dec. 2019; AECC, ‘产品介绍’ [Products], retrieved 17 Dec. 2019; CSSC, ‘集团简介’ [Company profile], retrieved 17 Dec. 2019; CSSC, *2015 China State Shipbuilding Corporation Social Responsibility Report* (CSSC: Beijing, 2016), pp. 29–37; CSIC, ‘集团简介’ [Company profile], retrieved 17 Dec. 2019; NORINCO, ‘军品’ [Defence product], retrieved 17 Dec. 2019; CSGC, 2016 中国兵器装备集团公司社会责任报告 [2016 China South Industries Group Corporation social responsibility report] (CSGC: Beijing, 2017), retrieved 4 Oct. 2018, pp. 64–65; and CETC, ‘Products & services’, retrieved 17 Dec. 2019.

**Estimating arms sales**

All 10 of the major arms companies (i.e. excluding the China Academy of Engineering Physics, a research institute) produce both military and civilian goods and services. Information on their civilian sales and total sales are available in various documents such as bond reports, credit rating reports,



**Box 2. Documents used for estimating arms sales for Chinese arms-producing and military services companies**

**Annual report** (年度报告)

Annual reports are issued by the company. They usually describe the activities of the preceding year as well as the company's financial performance.

**Audit report** (审计报告)

Audit reports are issued by an auditing firm based on the information provided by the audited company. For instance, CETC's audit report in 2017 was published by Wuyige Certified Public Accountants LLP (大信会计师事务所).

**Bond report** (面向合格投资者公开发行公司债券募集说明书)

Bond reports are issued by a securities company based on the information provided by both the company and the auditing firm that issued the audit report. The purpose of this report is to attract public bond investors. Since not all Chinese companies sell their bonds to the public, only a limited number of reports are available. For instance, NORINCO's bond report in 2018 was issued by CITIC Securities Company Ltd (中信证券股份有限公司).

**Corporate social responsibility report** (社会责任报告)

Corporate social responsibility (CSR) reports are issued annually by the company. They describe the company's activities, employee development and contributions to society. They usually include limited information related to financial performance, the number of employees and the number of research staff.

**Credit rating report** (跟踪评级报告)

Credit rating reports are issued by a credit rating firm. They include a credit assessment and an evaluation of the company's financial performance and the overall development of the whole sector. Such a report is mainly based on the information provided by the company. For example, AVIC's credit rating report in 2017 was issued by China Chengxin Credit Rating Group (中诚信国际信用评级有限责任公司).

audit reports, annual reports and corporate social responsibility (CSR) reports (see box 2). Arms sales are not listed in any of these reports.

However, a sales category termed 'other' is often used in the various document types to indicate what the Chinese Government terms 'classified' information. For example, in NORINCO's company report, the 'other' (其他) category is clearly explained to 'involve confidential information' (涉及涉密信息) and its contents are not to be disclosed to 'safeguard national interests' (维护国家利益). There are similar examples for CETC and CSGC. Crossmatching known company product categories (i.e. displayed on the company website) with those listed in the available documents supports the notion that the 'other' category most probably refers to weapons or arms.

Arms sales of Chinese companies are assumed to cover all sales of military goods and services, not only to the People's Liberation Army (PLA), but also to the paramilitary People's Armed Police (PAP).<sup>11</sup> This is particularly important since the PLA and the PAP use many of the same weapons made by such companies as NORINCO and CSGC. Sales by AVIC to the PAP would include equipment such as helicopters while sales by CETC would include

<sup>11</sup> On the military nature of the PAP, which has been officially under the control of the Central Military Commission since 2017, see SIPRI Military Expenditure Database, 'Sources and methods'; and Huang, K., 'China brings People's Armed Police under control of top military chiefs', *South China Morning Post*, Dec. 2017.



**The sales category ‘other’, which is often used in various documents to indicate what the Chinese Government terms ‘classified’ information, most probably refers to weapons or arms**

command, control, communications, computer, intelligence, surveillance and reconnaissance (C4ISR) systems.<sup>12</sup>

The general methodology used here is to assume that, after accounting for all civilian sales, any ‘other’ sales are military related. In other words, since civilian sales are clearly and well reported, estimated arms sales would be total sales minus civilian sales (which is usually equal to the ‘other’ category in company documents). Even when following this methodology, sources and approaches to estimating arms sales differ between companies. Thus, it is useful to provide a brief description of each company and the specific methodology used in each case.

#### *Aviation Industry Corporation of China (AVIC)*

Of the four arms companies assessed, AVIC has the least disaggregated financial information. Based on the various credit rating reports on the company, total sales are divided into three sectors: whole aircraft, non-aircraft related, and services and other business.<sup>13</sup> This matches the four main categories of military aircraft, civilian aircraft, industrial components, and logistics and services listed on the AVIC company website.<sup>14</sup> Income from services and other business, which accounts for roughly 35 per cent of AVIC’s total revenue, is from logistics, services and transportation and can be justifiably considered as sales of civilian products.<sup>15</sup>

The remaining 65 per cent of AVIC’s total revenue is divided roughly equally between sales of whole aircraft and non-aircraft-related sales. For whole aircraft sales, there is no known breakdown of the proportion of military or civilian sales. However, the 2018 credit rating report on AVIC states that most of its aircraft sales are military-related and that it aims to increase civilian aircraft sales to reach 5 per cent of total aircraft sales by 2020.<sup>16</sup> This focus on military aircraft production is supported by AVIC’s company report and website and other sources.<sup>17</sup> However, AVIC has a commercial partnership with Airbus on commercial aircraft with expected output to reach \$1 billion by 2020.<sup>18</sup>

Among the non-aircraft-related sales, AVIC makes most types of military-aviation subsystem (e.g. avionics, radars, spare parts). However, as with whole aircraft sales, sales of military systems are not disaggregated. Based on AVIC’s credit rating reports, it is clear that a substantial share of non-aircraft sales comes from non-military and non-aircraft-related com-

<sup>12</sup> Wuthnow, J., *China’s Other Army: The People’s Armed Police in an Era of Reform*, China Strategic Perspectives no. 14 (National Defense University Press: Washington, DC, Apr. 2019), pp. 8–9.

<sup>13</sup> China Chengxin Credit Rating Group, ‘中国航空工业集团公司2017年度跟踪评级报告’ [Aviation Industry Corporation of China credit rating report 2017], 30 June 2017, p. 10.

<sup>14</sup> AVIC, ‘业务领域’ [Business areas], retrieved 17 Dec. 2019, <<http://www.avic.com.cn/cn/ywly/index.shtml>>.

<sup>15</sup> China Chengxin Credit Rating Group (note 13), p. 10.

<sup>16</sup> China Chengxin Credit Rating Group (note 13), pp. 4–7.

<sup>17</sup> China Chengxin Credit Rating Group (note 13), pp. 4–7; AVIC (note 14); and Crane, K. et al., *The Effectiveness of China’s Industrial Policies in Commercial Aviation Manufacturing* (Rand Corporation: Santa Monica, CA, 2014), p. 9.

<sup>18</sup> Xinhua, ‘Airbus’ joint venture in China become sole composite structure supplier of some A350 XWB parts’, *China Daily*, 10 June 2019; and ‘Airbus lifts its partnership with China to new heights’, *Airbus*, 6 Sep. 2019.



ponents, covering a wide range of products (e.g. power and energy, electrical equipment, electronics, industrial materials and construction).<sup>19</sup> This suggests that AVIC has a considerable involvement in the manufacturing of industrial components.

In general, for a major arms company, the value of military subsystems such as avionics and spare parts can be substantial. However, in the case of AVIC this sector includes a wide range of non-aircraft-related civilian products, which reduces the share of military-related products in total sales of non-aircraft-related products. This is likely to mean that the value of military sales in this sector is not as high as for other major arms companies. However, the lack of disaggregation makes it impossible to reliably estimate the value of arms sales in AVIC's non-aircraft-related sales.

Based on the above, the estimate of AVIC's total arms sales includes only sales of whole aircraft. This estimate balances the overestimation of including the entire whole aircraft sector (which includes some civilian aircraft) with the underestimation of excluding the entire non-aircraft sector (which may include military subsystems). In all likelihood, however, the estimate of AVIC's arms sales, which reached 136.1 billion yuan (\$20.1 billion) in 2017, may be an underestimate as the omitted value of the military subsystems might be greater than the value of the civilian aircraft.

#### *China Electronics Technology Group Corporation (CETC)*

The primary source of information on CETC is the bond report for the company. According to the 2018 bond report, CETC's main business amounts to 99 per cent of the company's total revenue and is divided into military and civilian sales.<sup>20</sup> In 2017, income from CETC's main business was 203.9 billion yuan (\$30.0 billion) of which 119.6 billion yuan (\$17.9 billion) was civilian. The remaining 84.3 billion yuan (\$12.2 billion) must thus be arms sales.

CETC's investment in R&D makes it unique among Chinese arms companies: R&D accounts for 22 per cent of total sales—a far larger share than any other Chinese arms company. CETC is known as a significant contributor to Chinese military R&D and China's push to develop advanced technologies for the armed forces.<sup>21</sup> However, the R&D figures must be interpreted with caution since the company does not give a breakdown of the proportion derived from weapons research.

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#### *China North Industries Group Corporation (NORINCO)*

NORINCO's website states that the corporation's five main business products are heavy machinery, equipment and vehicles; petrochemicals and minerals; electrical optics; financial services and arms-related production

<sup>19</sup> AVIC (note 14); China Chengxin Credit Rating Group (note 13), p. 7; and Medeiros et al. (note 6), pp. 175–76.

<sup>20</sup> CITIC Securities, '中国电子科技集团有限公司2018年面向合格投资者公开发行公司债券(第三期)募集说明书' [The prospectus of China Electronics Technology Group Co., Ltd for the issuance of corporate bonds (phase 3) to qualified investors in 2018], 18 Dec. 2018, p. 56.

<sup>21</sup> Nouwens, M. and Legarda, H., 'China's pursuit of advanced dual-use technologies', Research paper, International Institute for Strategic Studies, 18 Dec. 2018; and Chan, M., 'Back to the future of self-reliance for China's military technology', *South China Morning Post*, 7 Dec. 2018.



(including small arms and light weapons).<sup>22</sup> This matches the five product categories in the 2018 bond report for the company, which explicitly states that total company revenues are made up of heavy equipment, oil and mineral products, electrical optics, financial services and ‘other’.<sup>23</sup> The first four categories account for civilian sales leaving the remainder, or ‘other’, as arms-related sales.

One important aspect of NORINCO’s total sales is that, while the electrical optics category is listed entirely as civilian sales, it is known to have substantial military applications.<sup>24</sup> The electrical optics product category accounts for roughly 5 per cent of total sales, of which a portion could be considered military.<sup>25</sup> However, without sufficiently disaggregated information on this category and considering the low share of total sales represented by electrical optics, estimates of the military share of electrical optic equipment cannot be made.

NORINCO’s total sales amounted to 427.6 billion yuan (\$64.3 billion) in 2017, of which the ‘other’ category, or arms sales, accounted for around 27 per cent or 116.2 billion yuan (\$17.2 billion). This estimate of the arms sales of NORINCO is likely to be a slight underestimate as it excludes sales from electrical optics for military purposes.

Outside military-related production, NORINCO’s primary source of revenue, accounting for 40 per cent of total revenue, is exploration for, production of and trade in oil and gas resources. Another 12 per cent is from petrochemicals, 15 per cent from heavy machinery and equipment, and 5 per cent from electrical optics.<sup>26</sup>

#### *China South Industries Group Corporation (CSGC)*

Information from bond and CSR reports and from the company’s website can be used to estimate CSGC’s total arms sales for 2015–17. The website shows that CSGC’s total revenue consists of six main categories.<sup>27</sup> This corresponds with the bond report, which gives total revenue as the sum of revenue from vehicles, motor vehicles, oil, minerals, ‘other main business’ and other business.<sup>28</sup> Other business consists of commercial revenue from car rentals, labour service and a small proportion of unspecified other activities. The only remaining unknown category is ‘other main business’. In line with the general methodology used here, and crosschecking with CSGC’s website and CSR report, this is assumed to be sales of military-related goods.

<sup>22</sup> China North Industries Group Corporation (NORINCO), ‘业务与服务’ [Business and services], retrieved 24 July 2019, <<http://www.norincogroup.com.cn/col/col5/index.html>>.

<sup>23</sup> CITIC Securities, ‘中国兵器工业集团有限公司2018年面向合格投资者公开发行公司债券(第二期)募集说明书’ [China North Industries Group Corporation publicly issues corporate bonds (second phase) prospectus to qualified investors in 2018], 6 Sep. 2018, pp. 87–88.

<sup>24</sup> Omega Research Foundation and International Peace Information Service (IPIS), *Working Paper on China North Industries Group Corporation (CNGC)* (Omega and IPIS: Antwerp, Oct. 2014), pp. 21–22.

<sup>25</sup> CITIC Securities (note 23), pp. 87–88.

<sup>26</sup> CITIC Securities (note 23), pp. 88, 96–97.

<sup>27</sup> China South Industries Group Corporation (CSGC), ‘产业介绍’ [Main business], retrieved 17 Dec. 2019, <<http://www.csgc.com.cn/1144.html>>.

<sup>28</sup> CITIC Securities, ‘中国兵器装备集团公司2018年公开发行公司债券(第一期)募集说明书(面向合格投资者)’ [The prospectus of China South Industries Group Corporation for the issuance of corporate bonds (phase 1) in 2018 (for qualified investors)], 27 Aug. 2018.



‘Other main business’ sales are reported to be around 11 per cent of total revenue. In 2017, CSGC’s total sales were 302.7 billion yuan (\$44.5 billion). Subtracting civilian sales of 271.4 billion yuan (\$39.9 billion) leaves arms sales of 31.3 billion yuan (\$4.6 billion).

### III. Ranking Chinese arms companies

Based on their estimated arms sales in 2017, the four major Chinese arms companies can be compared with the major arms companies from the rest of the world listed in the SIPRI Top 100. The Top 100 for 2017 is dominated by companies based in the United States, Western Europe and Russia: together they account for 76 of the 100 companies, with over 90 per cent of their arms sales.<sup>29</sup> Among the top 20 companies, 11 are based in the USA, 6 in Western Europe (2 in France, 2 in the United Kingdom, 1 in Italy and 1 trans-European) and 3 in Russia.

If the four Chinese arms companies investigated here were included in the Top 100, they would rank among the largest arms producers in the world (see table 2). Indeed, based on their arms sales in 2017, three of them—AVIC, NORINCO and CETC—would be ranked among the top 10 largest arms companies.

With arms sales of \$20.1 billion in 2017 (34 per cent of its total sales), AVIC is estimated to be China’s largest arms company. Globally, it would be the third-largest aircraft producer, behind the US companies Lockheed Martin and Boeing, and the sixth-largest arms company, with arms sales comparable to Boeing, Northrop Grumman, Raytheon and BAE Systems. AVIC’s arms sales were more than double those of the largest Russian arms company, Almaz-Antey, and three times larger than Russia’s largest aircraft producer, United Aircraft Corporation. Among Chinese arms companies, AVIC is also the largest employer. It employs around 460 000 people, including in over 100 subsidiaries that conduct both arms-related and civilian production.<sup>30</sup> AVIC has a monopoly on military aircraft manufacturing in China, and its arms sales increased by 34 per cent between 2015 and 2017. The significant growth is unsurprising as Chinese aircraft procurement has been increasing.<sup>31</sup> With a greater volume of orders and deliveries of military aircraft and subsystems, AVIC’s arms sales are expected to increase further in the coming years.<sup>32</sup>

NORINCO is estimated to be China’s second largest arms company and would be ranked as the eighth largest arms producer in the world in 2017. With arms sales of \$17.2 billion in 2017 (27 per cent of total sales), NORINCO is the world’s largest specialist in production of land systems. It is the second biggest employer (more than 240 000 employees) in the Chinese arms

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<sup>29</sup> Fleurant, A. et al., ‘The SIPRI top 100 arms-producing and military services companies, 2017’, SIPRI Fact Sheet, Dec. 2018.

<sup>30</sup> Aviation Industry Corporation of China (AVIC), *2017 Aviation Industry Corporation of China Social Responsibility Report* (AVIC: Beijing, 2018), pp. 4, 56.

<sup>31</sup> US Department of Defense (DOD), *Military and Security Developments Involving the People’s Republic of China 2018*, Annual report to the US Congress (DOD: Washington, DC, 16 May 2018), pp. 33–34; and Huang, K., ‘China’s air force quietly adds new J-16 fighter jets to “push the envelope”’, *South China Morning Post*, 12 Aug. 2018.

<sup>32</sup> China Chengxin Credit Rating Group (note 13), pp. 4–8.

**Table 2.** The top 20 arms-producing and military services companies expanded to include selected Chinese companies, 2015–17

Rank, 2017 <sup>a</sup>	Company	Country	Arms sales (constant 2017 US\$ b.)			Change, 2015–17 (%) <sup>b</sup>	Arms sales as share of total sales, 2017 (%)
			2017	2016	2015		
1	Lockheed Martin	United States	43.9	41.5	37.7	16	88
2	Boeing	United States	26.9	30.1	28.9	-6.8	29
3	Northrop Grumman	United States	22.4	21.9	20.7	7.8	87
4	Raytheon	United States	22.0	23.4	22.5	-2.1	87
5	BAE Systems	United Kingdom	21.0	22.2	22.1	-5.1	95
6	Aviation Industry Corp. of China (AVIC)	China	20.1	17.4	15.0	34	34
7	General Dynamics	United States	19.5	19.6	19.9	-2.0	63
8	China North Industries Group Corp. (NORINCO)	China	17.2	17.3	16.2	6.3	27
9	China Electronics Technology Group Corp. (CETC)	China	12.2	11.0	11.5	6.1	40
10	Airbus Group	Trans-European <sup>c</sup>	10.0	12.9	13.3	-25 <sup>d</sup>	15
11	Thales	France	9.0	8.4	8.3	7.5	51
12	Leonardo	Italy	8.8	8.8	9.6	-7.8	68
13	Almaz-Antey	Russia	8.6	7.3	8.6	-0.4	94
14	United Technologies	United States	7.8	7.0	9.8	-21	13
15	L3 Technologies	United States	7.8	7.8	9.1	-15	79
16	Huntington Ingalls Industries	United States	6.5	6.9	7.0	-7.1	87
17	United Aircraft Corp.	Russia	6.5	6.2	5.4	20	83
18	United Shipbuilding Corp.	Russia	5.0	4.9	4.8	3.1	89
19	China South Industries Group Corp. (CSGC)	China	4.6	8.1	8.7	-47	10
20	Honeywell International	United States	4.5	3.6	3.5	28	11

<sup>a</sup> Companies are ranked according to their arms sales in 2017.

<sup>b</sup> Figures in this column are based on raw data, not the rounded figures in the arms sales columns.

<sup>c</sup> Trans-European companies are companies whose ownership and control structures are located in more than one European country.

<sup>d</sup> This decrease is not due to lower sales but is related to Airbus's sale in 2017 of its military electronics division.

Source: SIPRI Arms Industry Database, <<https://www.sipri.org/databases/armsindustry>>, as of Dec. 2018.

industry, behind AVIC, and has 51 subsidiaries as well as 26 research institutes.<sup>33</sup> NORINCO's arms sales rose by 6.3 per cent between 2015 and 2017. Continued high levels of arms sales and even further increases are expected as China pushes towards completing its modernization efforts by 2035.<sup>34</sup> The size of NORINCO's arms sales is due to a combination of procurement by the PLA and by the PAP.<sup>35</sup>

The third Chinese company with arms sales large enough to be ranked in the top 10 is CETC, with arms sales of \$12.2 billion in 2017 (40 per cent

<sup>33</sup> NORINCO, 2017 社会责任报告 [2017 corporate social responsibility report] (NORINCO: Beijing, 30 July 2018), p. 4.

<sup>34</sup> Bommakanti, K., 'China's military modernisation: Recent trends', Observer Research Foundation (ORF) Issue Brief no. 201, Oct. 2017; and Hille, K., 'China's army redoubles modernisation effort', *Financial Times*, 28 Jan. 2019.

<sup>35</sup> Boyd, H. and Nouwens, M., 'China's People's Armed Police: Reorganised and refocused', Military Balance Blog, International Institute for Strategic Studies, 21 June 2019.



of total sales). CETC focuses on electronics (e.g. radars, software, military communications networks), components, research and development (R&D), and services. It has the highest number of research employees of the four Chinese arms companies, at around 93 000.<sup>36</sup> Similar to NORINCO, CETC's arms sales remained relatively stable between 2015 and 2017, increasing by only 6.1 per cent.

CSGC is by far the smallest of the four Chinese arms companies in terms of arms sales. It operates in the same sector as NORINCO, with a focus on military vehicles. CSGC's arms sales in 2017 were \$4.6 billion (10 per cent of its total sales), which would rank it 19th in the Top 100. By way of comparison, Oshkosh Corporation, a US company known for making military vehicles, had arms sales of \$1.8 billion in 2017. CSGC is the only company of the four analysed to have experienced a substantial fall in arms sales, with a drop of 47 per cent between 2015 and 2017. The lack of information on the company's arms sales makes it difficult to pinpoint the exact reason for this significant decrease.

Among the four companies, arms sales as a share of total sales was largest for CETC, at 40 per cent in 2017; the share was smallest for CSGC, at 10 per cent. These shares are all low compared with those of most of the top 20 arms-producing companies, which are typically more than 50 per cent (exceptions being Boeing, Airbus, United Technologies and Honeywell International). These Chinese companies are highly diversified, with the majority of their revenues coming from civilian-related activities.

Most of the non-Chinese arms companies ranked in the top 20 tend to produce a wide range of military products. For example, BAE Systems' products range from ships, via tanks to aircraft and missiles. In contrast, the Chinese arms companies, while diversified in the sense that they produce both civilian and military goods, are more concentrated in one weapon sector—they generally specialize in one of the four main conventional arms production sectors: aerospace, electronics, land systems and shipbuilding.

The combined estimated arms sales of the four Chinese arms companies totalled \$54.1 billion in 2017. While this is already \$16.4 billion more than the total for the 10 Russian companies in the Top 100 for 2017 and \$18.4 billion more than the total for the 7 British companies in the Top 100, it is most likely still an underestimate.<sup>37</sup> Based on this estimate, which accounts for the arms sales of just four companies, China would have the second-largest national share of the total arms sales of the Top 100 companies. It is safe to conclude that China is the second-largest arms producing country in the world, behind the USA.

While this study covers at least one company in each of the aerospace, electronics and land systems sectors, it leaves out shipbuilding—a major sector of conventional weapon production—due to insufficient information. However, in the case of shipbuilding, it is possible to gain a rough idea of the size of China's industry based on available information about the overall growth of the Chinese naval industry, known delivery of military ships, contract costs

***China is the second-largest arms producing country in the world, behind the USA***

<sup>36</sup> CETC, 2017 企业社会责任报告 [2017 corporation social responsibility report] (CETC: Beijing, 2018), p. 96.

<sup>37</sup> Fleurant et al. (note 29).

**Table 3.** Sales of Chinese arms-producing and military services companies across different methodologies, 2017

Company	Béraud-Sudreau and Nouwens's estimate <sup>a</sup>			SIPRI's estimate		
	Total sales (\$US b.)	Arms sales (\$US b.)	Arms sales as share of total sales (%)	Total sales (\$US b.)	Arms sales (\$US b.)	Arms sales as share of total sales (%)
Aviation Industry Corporation of China (AVIC)	59.7	22.4	38	59.1	20.1	34
China Aerospace Science and Technology Corporation (CASC)	34.3	7.3	21	..	..	..
China Aerospace Science and Industry Corporation (CASIC)	34.2	11.0	32	..	..	..
China Electronics Technology Group Corporation (CETC)	30.2	9.3	31	30.5	12.2	40
China South Industries Group Corporation (CSGC)	44.5	13.8	31	46.0	4.6	10
China Shipbuilding Industry Corporation (CSIC)	45.6	9.1	20	..	..	..
China State Shipbuilding Corporation (CSSC)	29.6	4.7	16	..	..	..
China North Industries Group Corporation (NORINCO)	64.0	13.9	22	63.7	17.2	27

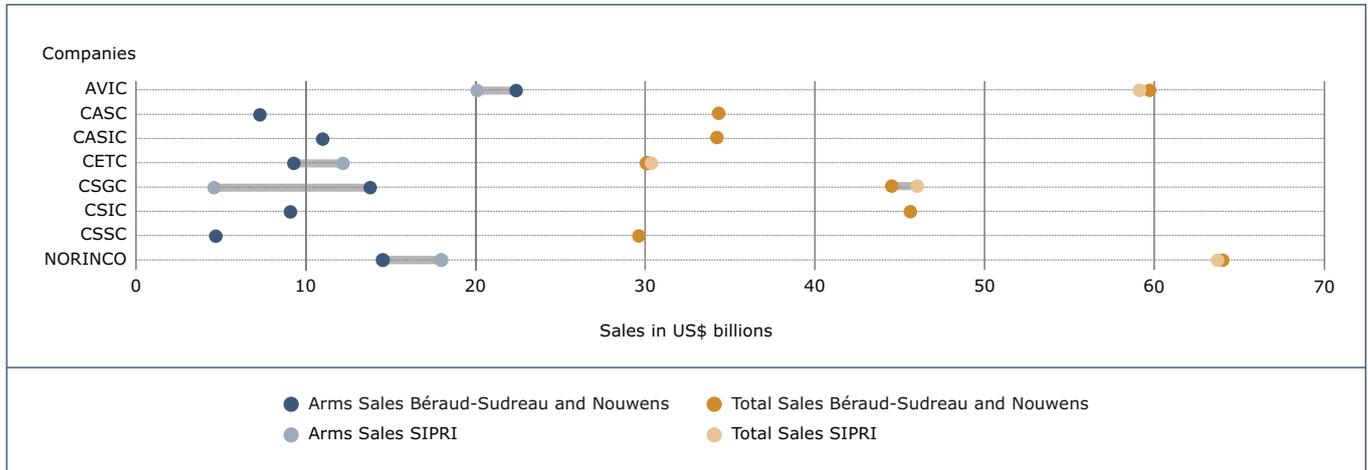
.. = no data available.

<sup>a</sup> Béraud-Sudreau, L. and Nouwens, M., 'Weighing giants: Taking stock of the expansion of China's defence industry', *Defence and Peace Economics*, published online 27 June 2019.

of some of these military ships and values of equivalent ships produced in other countries.

In 2017 China's two main shipbuilding companies, CSIC and CSSC, delivered about 13 major military ships (two T052 destroyers, three T054A frigates and eight T056 corvettes) and 4 submarines (one type 094 nuclear-powered ballistic missile submarine, one type 093 nuclear-powered submarine and two type 039 conventional submarines). By way of comparison, in 2017 Huntington Ingalls Industries, the largest US shipbuilder, delivered three military ships (one aircraft carrier, one destroyer and one amphibious transporter) and one nuclear-powered submarine, and Naval Group, the largest European shipbuilder, delivered two military ships (one corvette and one frigate) and one conventional submarine.<sup>38</sup> The 2017 arms sales of Huntington Ingalls were \$6.5 billion and those of Naval Group were \$4.1 billion. Although both companies also generate revenue from military-related services such as repairs and service, it is reasonable to assume that CSIC and CSSC also do so. Thus, this basic comparison indicates that the Chinese shipbuilding industry is considerable in size. The aggregate arms sales of CSIC and CSSC are likely to be at least as large, if not larger than the most prominent US and European shipbuilders: the arms sales of each are possibly around \$10 billion. CSIC and CSSC would thus also most certainly rank among the top 20 arms-producing companies in the SIPRI Top 100.

<sup>38</sup> Huntington Ingalls Industries, *Hard Stuff Done Right: 2017 Annual Report* (Huntington Ingalls Industries: Newport News, VA, 2018), pp. 1–3; and Naval Group, *Financial Report 2017* (Naval Group: Paris, Apr. 2018, pp. 1–11).



**Figure 1.** Visual representation of the sales of Chinese arms-producing and military services companies across different methodologies, 2017

AVIC = Aviation Industry Corporation of China; CASC = China Aerospace Science and Technology Corporation; CASIC = China Aerospace Science and Industry Corporation; CETC = China Electronics Technology Group Corporation; CSGC = China South Industries Group Corporation; CSIC = China Shipbuilding Industry Corporation; CSSC = China State Shipbuilding Corporation; NORINCO = China North Industries Group Corporation.

#### IV. Robustness check of the estimates

Given the uncertainty in estimating Chinese arms sales, there is a need to check the robustness of the estimated figures. One way to do this is to compare the estimated sales figures across different methodologies while another is to assess how realistic the arms sales estimates are in relation to known data on China’s military expenditure and arms exports.

##### Comparison of Chinese arms sales across different methodologies

Béraud-Sudreau and Nouwens provide 2017 arms sales estimates for eight Chinese arms companies in the first study to develop such estimates based on Chinese sources (see table 3). Their methodology is based on an extensive survey of almost 460 subsidiaries of the eight main Chinese arms-producing companies.<sup>39</sup>

While the two methodologies result in similar figures for each company’s total sales, there are some differences in the estimated arms sales figures. In the case of CSGC, the estimates differ by 200 per cent, while for CETC and NORINCO the differences are 24 and 19 per cent, respectively. It is only for AVIC that the two methodologies give similar estimates, with a difference in arms sales for 2017 of only 11 per cent (see figure 1).

While there are substantial differences in the estimated arms sales of companies, the variation is far smaller at the aggregate sector level. The Chinese land-based systems sector is comprised of NORINCO and CSGC, the combined arms sales of which amounted to \$27.7 billion in 2017 according to Béraud-Sudreau and Nouwens—about 27 per cent higher than the estimate of \$21.8 billion given here. Thus, the 200 per cent difference in the two estimates of the arms sales of CSGC is dispersed at the sector level. If the interest is less about the financial sales of each individual company

<sup>39</sup> For a detailed explanation of the methodology see Béraud-Sudreau and Nouwens (note 7).

and more about the overall production of land-based systems in China, then the two methodologies offer concurring evidence that it is in the region of \$22–28 billion—a substantial amount.

At the overall arms industry level, the difference in the total estimated arms sales of all the companies for which both studies have estimates is even smaller. According to Béraud-Sudreau and Nouwens, the combined arms sales of AVIC, CETC, NORINCO and CSCG were \$59.4 billion, while according to the estimates here the total is \$54.1 billion, a difference of only 9.8 per cent.

The similarity in the two aggregate estimates builds consensus on the known size of the Chinese arms industry and shows robustness in the estimates. At the company level, the differences may be due to a variety of reasons. One reason relates to how Béraud-Sudreau and Nouwens estimate the arms sales of each company's subsidiaries: while the overall size of the sector is known, a lack of company-specific information may mean that the distribution of sales to each company might be incorrect.

### **Chinese company arms sales in comparison with Chinese military expenditure and arms exports**

Measuring the arms sales estimates against China's military expenditure figures (both total spending and its components) allows for an assessment of the former's realism. China's military spending in 2017 amounted to \$228 billion, according to SIPRI estimates.<sup>40</sup> SIPRI estimates Chinese military spending to be substantially higher than the official defence budget (which was reported as \$151 billion in 2017) as it includes various components of spending from other parts of the state budget.<sup>41</sup> This includes about \$30 billion for the PAP, an estimated \$23 billion for additional military research, development, testing and evaluation, and around \$15 billion for soldiers' demobilization and retirement payments.

Comparing the estimated arms sales to SIPRI's estimate of Chinese military spending, the \$54.1 billion for AVIC, CETC, NORINCO and CSCG accounts for 24 per cent of China's military spending in 2017. Adding hypothetical figures for the shipbuilding sector would give total arms sales of the Chinese arms industry in the region of \$70–80 billion. This would represent 30–35 per cent of Chinese military expenditure. This share is in line with China's report to the United Nations on military spending for 2017 and an estimate by the Rand Corporation of Chinese defence procurement spending.<sup>42</sup>

In addition to domestic procurement, part of the arms industry output is exported. However, there is no official Chinese data on arms exports. A lack of open-source estimates of China's arms exports means that their financial value remains unknown.<sup>43</sup>

<sup>40</sup> SIPRI Military Expenditure Database (note 8).

<sup>41</sup> On the SIPRI methodology see SIPRI Military Expenditure Database, 'Sources and methods' (note 11). For the official 2017 Chinese defence budget see United Nations Office for Disarmament Affairs (UNODA), 'United Nations Report on Military Expenditures'.

<sup>42</sup> United Nations Office for Disarmament Affairs (note 41); and Wolf, C. et al., *China and India, 2025: A Comparative Assessment* (Rand Corporation: Santa Monica, CA, 2011).

<sup>43</sup> Estimates that are not based on open sources include US Department of State, 'World military expenditures and arms transfers 2018', [n.d.]; and Theohary, C. A., *Conventional Arms Transfers to*



SIPRI provides data on Chinese exports of major conventional weapons, based on open sources. However, this measures the volume of transfers, in the form of a trend indicator value (TIV), not the financial value, and so is not comparable to economic statistics. The TIV can be used as an indication of the trend in transfers of major conventional weapons from and to China as well as the relative size of Chinese arms transfers compared with other arms-exporting countries.<sup>44</sup> Between the five-year periods 1999–2003 and 2014–18, China’s imports of major arms fell by 50 per cent while its exports rose by 208 per cent, and China rose to become the fifth-largest supplier of major conventional weapons in the world.<sup>45</sup> This supports the notion that the Chinese arms industry is growing. It indicates not only that China is becoming less dependent on imports of foreign weapons and military technology but also that its industry has developed to a point where there is an increased demand for its weapons overseas.

The general trend in China’s arms exports supports the estimate given here of the financial value of China’s arms industry. The estimate of \$54.1 billion in sales for the four companies profiled and the ranking of the Chinese arms industry as the second-largest by sales are in line with China’s position as the world’s second-largest military spender and its rise in arms exports to place it as the fifth-largest exporter.

## V. Conclusions

This account of the arms sales of the Chinese arms industry complements the previous research by Béraud-Sudreau and Nouwens. It improves understanding of the size of the Chinese arms industry and the position of Chinese arms companies in the SIPRI Top 100 arms-producing and military services companies and in the SIPRI Arms Industry Database. Together with data on Chinese arms transfers and military expenditure in other SIPRI databases, it offers a more comprehensive picture of China’s military-related activities.

Overall, the estimates in this paper provide quantitative evidence that the Chinese arms industry is among the largest national arms industries in the world. Based on arms sales, all four companies profiled would be ranked among the 20 largest arms companies globally, with three—AVIC, NORINCO and CETC—in the top 10. The arms sales of just these four Chinese companies indicate that China is the second-largest arms producer in the world, behind the USA and ahead of Russia. However, there remains a need for more detailed research on the remaining six Chinese arms companies to offer a complete estimate of the Chinese arms industry.

While progress has been made to provide more data on Chinese arms companies, an important caveat remains: the lack of transparency in the arms sales figures of Chinese arms companies. This has been the main

***China is becoming less dependent on imports of foreign weapons and military technology, and its industry has developed to a point where there is an increased demand for its weapons overseas***

*Developing Nations, 2007–2014*, Congressional Research Service (CRS) Report for Congress R44320 (US Congress, CRS: Washington, DC, 21 Dec. 2015), tables 30, 35.

<sup>44</sup> Wezeman, S. T. et al., ‘Supplier developments, 2018’, *SIPRI Yearbook 2019: Armaments, Disarmament and International Security* (Oxford University Press: Oxford, 2019), table 5.2.

<sup>45</sup> SIPRI Arms Transfers Database (note 8); and Wezeman, P. D. et al., ‘Trends in international arms transfers, 2018’, SIPRI Fact Sheet, Mar. 2019.



reason for the lack of understanding of or information on these companies. Unlike many Western counterparts, the Chinese Government limits access to information about all arms companies in the interest of national security. As a result, military-related sales are not directly mentioned in any of the publicly available documents cited in this paper. All arms sales figures for Chinese companies remain estimates with a range of uncertainty. This is illustrated by the comparison of the arms sales estimates of Béraud-Sudreau and Nouwens and those given here. The differences in arms sales at the company level support the need for more research—more importantly, they highlight these companies' lack of transparency, which hinders the understanding of China's arms industry.

Future research should aim to further develop the existing methodologies for estimating the arms sales of Chinese companies. Other avenues for future research are comparative studies between Chinese and non-Chinese arms companies and investigation of the evolution of Chinese companies as the country moves towards its 2035 and 2049 modernization goals.



## Abbreviations

AVIC	Aviation Industry Corporation of China
CASIC	China Aerospace Science and Industry Corporation
CASC	China Aerospace Science and Technology Corporation
CETC	China Electronics Technology Group Corporation
CSIC	China Shipbuilding Industry Corporation
NORINCO	China North Industries Group Corporation
CSGC	China South Industries Group Corporation
CSSC	China State Shipbuilding Corporation
C4ISR	command, control, communications, computer, intelligence, surveillance and reconnaissance systems
CSR	corporate social responsibility
PAP	People's Armed Police
PLA	People's Liberation Army
R&D	research and development
TIV	trend indicator value



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# ESTIMATING THE ARMS SALES OF CHINESE COMPANIES

NAN TIAN AND FEI SU

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