# The Anatomy of SOE in China

Loren Brandt* Ruochen Dai† Xiaobo Zhang‡

April, 2024

**Abstract**

China's state owned enterprise groups are at the core of China's transition from state socialism to state capitalism and have come to occupy a prominent position in the domestic and global economy. In this paper, we leverage several unique data bases to reconstruct the pyramid-like structures of central state-owned groups since SASAC was established in 2003 and lay out a set of first-order facts about their evolution through 2019. We focus on key metrics relating to these groups' overall size, hierarchy, the role of listed firms and their subsidiaries within the group, as well as the economic relationship between subsidiaries as seen through the lens of their vertical integration. Utilizing financial information these firms report to SAIC, we examine the correlation between key financial indicators and measures capturing how individual subsidiaries are embedded in these complex hierarchies. Our findings are indicative of horizontal and vertical agency problems running through these groups and tensions between the state's strategic desire for self-sufficiency and capabilities in strategic lines of business, better economic returns, and the interests of insiders in these groups. In this regard, the growing number of layers and subsidiaries reflects as much bottom-up processes as it does top-down.

**Keywords**. Business group, Pyramidal structure, Vertical integration, Oversea investments

*University of Toronto. loren.brandt@utoronto.ca
†Central University of Finance and Economics. r.dai@cufe.edu.cn
‡Peking University. x.zhang@gsm.pku.edu.cn

# 1 Introduction

China's state owned enterprise groups have come to occupy a prominent position in China's domestic economy and also globally. In 2020, there were 48 central SOEs and 32 provincial SOEs that were ranked among the Fortune 500. Much of the analysis of SOE groups has been at a macro level, and focused on broad trends in the sector. Over the last two decades, rapid expansion has been accompanied by declining returns to investment and profitability (Lardy, 2019). In general, we know much less about these groups' internal organization and structure, the forces driving changes, and their effect on enterprise group and subsidiary outcomes (Lin and Milhaupt, 2013; Sutherland and Ning, 2015). The big questions are clear however: In whose interest are these groups run? What are their objectives? How are they structured to achieve these ends? And what is the effect of their structure on subsidiary and group performance?

In this paper, we leverage several unique data bases to lay out a set of first-order facts about enterprise groups under central government control. Complicating empirical analysis is the fact that the organization of these groups is endogenous, the product of interests inside and outside these groups: the Chinese Communist Party (CCP), China's State-owned Assets Supervision and Administration Commission (SASAC), enterprise groups' top-management and other insiders, minority investors, as well as regulatory groups such as China Security Regulatory Commission (CSRC). Despite the limitations this imposes on causal inference, we see documentation as a critical first step in the development of more elaborate models of enterprise group behavior.

Drawing on the Business Registry of China's State Administration of Industry and Commerce (SAIC), which includes the universe of all firms in China, we first reconstruct the pyramid-like structures of central state-owned groups since SASAC was established in 2003. We focus on key metrics relating to these groups' overall size, hierarchy, the role of listed firms and their subsidiaries within the group, as well as the economic relationship between subsidiaries as seen through the lens of their input-output relationships with the group's core line of business. We also examine the role of "minority" investors in these groups, as well as investments by the group in "affiliated" companies that these groups do not control. Next, utilizing financial information SAIC requires firms to report as part of an "inspection process", we examine the correlation between key financial indicators and measures capturing how individual subsidiaries are embedded in these complex hierarchies.

A number of major findings emerge regarding their organization. In the context of

a marked consolidation of enterprise groups under central government control, we observe rapid growth in the state sector – in total and per group – measured in terms of registered capital, assets, and the number of subsidiaries. Changes in the total number of subsidiaries conceal disparate forces shaping individual group's internal structure: the number expanded through new acquisitions and the establishment of entirely new subsidiaries while the number contracted through liquidation, bankruptcy, and the sale of subsidiaries to other enterprises. Within groups, hierarchies have also become much longer with the percentage of subsidiaries and registered capital in lower tiers of the group expanding. Moreover, much of the growth and expansion has occurred through newly established listed companies and their subsidiaries, consistent with their role in providing outside finance for group expansion. At the same time, minority outside ownership in these subsidiaries has increased throughout the hierarchy, but especially in lower-tiered firms, while minority (non-controlling) investment by these groups in others firms has also increased. Finally, group expansion has been accompanied by a marked reduction in the degree of vertically integration at the group level, most noticeably as lower-tier subsidiaries entered lines of business less connected to the group's core business.

As for financial outcomes, we find that the allocation of resources and the rate of return on assets (ROA) within the group are systematically related to hierarchy and vertical integration. Resources flow to higher-tier subsidiaries that are most closely linked economically with the group's main line of business. At the same time, listed companies and their subsidiary are also larger. Controlling for their tier in the hierarchy, listed firms are more than three and a half times larger than non-listed firms, and their subsidiary almost fifty percent larger in size. On the other hand, these same attributes are associated with lower returns on assets, or profitability. Higher-tier subsidiary nearer to HQs as well as those that are more tightly linked economically to the group's core business experienced lower return on their assets. Returns to listed firms are also significantly lower however this is partly offset by higher returns to subsidiary under their control. More generally, distance from group headquarters, the "ultimate" controller, looks to help insulate firms from political intervention and is associated with higher returns.

Theories of pyramid business groups that focus on the incentives and top-down decisions of owners (Khanna and Yafeh, 2007) cannot fully explain our findings on Chinese SOEs. An analysis of cash right leverage, which captures the relationship between control and cash-flow rights, suggests that the use of pyramids to control more assets is probably not the major reason Chinese SOE groups have so many layers and subsidiaries. Our

results are indicative of vertical and horizontal agency problems running through these groups and suggest likely conflicts between the state's strategic desire to develop capabilities in core lines of business, economic returns, and the interests of insiders.

Tensions between centralizing and decentralizing forces are reflected in the separation between upper-tier subsidiary in strategic businesses and lower-tier counterparts operating in more profitable lines of business. Decentralizing forces and longer hierarchies have helped to insulate managers from intervention at the top, allowed for more outside ownership, and facilitated entry into lines of business outside the core, all of which are associated with higher returns. But these benefits have clearly been diluted by other forces underlying the secular decline in returns in these groups. Between 2007 and 2017, the return on assets of enterprises under central SASAC declined from 6.7% to 2.6%, a decline of more than sixty percent. Alternative explanations for this decline include costly government regulation in strategic industry; the high costs of vertical integration within these groups; and renewed softening of budget constraints for SOEs and rising agency costs tied to the state's commitment to self-sufficiency in strategic sectors and jobs.[1]

One shortcoming of the Business Registry is that it does not capture group activity outside of China. In a final exercise, we draw on several recently compiled databases on China's overseas foreign direct investment to offer a preliminary picture of central SOE group expansion that spans changes within and outside of China, saving more detailed analysis of the linkages for future work. Over the period between 2003-2017, overseas acquisitions represent slightly more than an eighth of the increase in the market valuation of these groups. It is also highly concentrated in terms of sectors and firms. In general, the majority of the expansion in China's central enterprise groups occurs domestically through the establishment of new local subsidiary, expansion by incumbent subsidiary, and domestic merger and acquisition. It remains to be seen how external expansion has affected group returns and profitability.

Our paper is organized as follows. In section 2, we briefly review the literature on business groups. In section 3, we discuss our key source of data, the Business Registry, and how we construct the hierarchy of these business groups. Section 4 documents central SOE groups in 2019, followed by an examination of their evolution since 2003 in Section 5. We next analyze changes within groups in Section 6 and review financial performance at both the group and subsidiary level in Section 7. In Section 8, we incorporate

[1]When a firm performs poorly, high agency costs make it difficult for the state to sort out the role of the high costs of upgrading versus poor management. Soft budget constraints are a consequence. There is an obvious analogy here with how a commitment to jobs in the state sector contributed to soft-budget constraints in the 1980s and early 1990s.

groups' outward expansion into our analysis to better assess their overall growth. Section 9 concludes.

## 2 Literature Review

### 2.1 General

There is a growing literature on business groups that focuses on their rationale as well as the effect of their structure on how these groups function and perform (Khanna and Yafeh, 2007). Empirically, business groups tend to be most common in emerging economies. A prominent feature is their pyramid-like ownership structures in which control is exercised by an apex company.

There are competing interpretations for business groups, two of which we highlight. First, in settings in which product and factor markets are missing or incomplete, business groups with a high level of vertical integration could help reduce transaction costs (Williamson, 1979; Acemoglu et al., 2009). They also allow better use of intangible assets (Atalay et al., 2014). Exchange within the group is effectively a second-best substitute for market exchange. Groups may also provide financing advantages in setting up new firms (Almeida and Wolfenzon, 2006; Bena and Ortiz-Molina, 2013). Thus, we might expect firms within groups to out-perform those outside, however with institutional deepening and development, this advantage may dissipate.

Second, pyramids are used by controlling shareholders at the top of the group to expropriate resources from minority shareholders of lower-tiered firms through a mechanism known as tunneling. This is made possible in lower-tiered subsidiaries by a widening gap between control and ownership as reflected in differences between control and cash flow rights. In lower-tier subsidiaries, the top exercises control with minimal ownership, which they use to expropriate resources through mechanisms such as related party transactions (RPT).[2] Tunneling is often linked with the role of listed companies, which are prominent in business groups, and are an important source of external finance (La Porta et al., 1999; Claessens et al., 2000; Morck et al., 2005). Moreover, since listed companies often control other listed companies, this allows ultimate controllers to exercise control over numerous other firms with only modest investment.

[2] A related-party transaction is an arrangement between two parties that have a preexisting relationship. Sales, loan agreements and asset sales are common examples of RPT.

### 2.2 Chinese Business Groups

The role of business groups in China, state as well as non-state, has expanded over time, with much of the focus in the literature on state-controlled business groups.[3] The formation of state-owned business groups dates to the early 1990s and several pilots conducted by the State Council that reorganized firms formerly under industrial ministries into business groups. These new groups were seen as central to the state's goal of developing leading transnational corporations in strategic industry. Corporatization of the SOEs, i.e., the restructuring and transformation of state-owned assets or organization into a corporation, and the establishment of listed firms within groups were central to their expansion. Improved governance and discipline were viewed as additional benefits of the listing process that would spill over to non-listed firms within the group. These efforts have had their critics however. Walter (2014), for example, argues that "Beijing corporatized SOEs in an effort to recapitalize them with other people's money."

A small but growing literature is emerging that examines vertical and horizontal agency problems within state-owned business groups and their implications for resource allocation and outcomes at both the group and subsidiary level (Jiang et al., 2010; He et al., 2013; Ljungqvist et al., 2015; Fan et al., 2013, 2017). There are at least four key agency problems: 1. between the State and SASAC (the nominal ultimate owner); 2. between SASAC and SOE managers; 3. between SASAC and minority shareholders; and 4. between SOE managers and minority shareholders.[4] The first two are vertical in nature and the second two are horizontal.[5] Here we largely ignore the incentive issues between the state and SASAC and focus on the other three.

At the heart of these agency issues are several forces. First, non-economic objectives of the state undermine economic performance, creating a conflict between the state and minority shareholders (Jiang et al., 2010; Ljungqvist et al., 2015). Second, the difficulty of overseeing firm managers on a day-to-day basis encourages self-serving behavior at the expense of both the state and minority shareholders. There are potential remedies for these problems. Groups can be internally configured to help mitigate the vertical agency problems. Fan et al. (2013), and Opie et al. (2019), for example, argue that the construction of longer pyramids reflects deliberate efforts to better insulate managers from government pressure to achieve non-economic objectives. Longer hierarchies represent a

[3] For an early examination of SOE business groups in China, see Sutherland and Ning (2015). For a recent examination of private business groups, see Huang et al. (2022).

[4] In addition, there are differences in incentives between managers in top and lower-tier subsidiary.

[5] Vertically, there are also differences between SOEs under central versus local administration. For an analysis of decentralization of SOE control, see Huang et al. (2017)

credible mechanism to reduce government intervention, but come at the expense of rising agency costs associated with manager's incentives to expropriate resources.

Personnel ties connecting the state, groups and firms are also important to addressing agency costs (Lin and Milhaupt, 2013; Ljungqvist et al., 2015). Horizontal personnel ties crossing state and party lines can help align incentives and behavior. Vertical "interlocks" involving leading management in the group and listed companies serve a similar role (Leutert, 2016, 2018; Beck and Brødsgaard, 2022). At the very top of these groups, a major objective of managers is promotion to higher-level government positions, behavior that is reinforced by weak incentive-based pay within the SOE system. Promotion incentives may help to align executive management behavior with the interests of the controlling shareholders, i.e. the state, including expropriation from minority shareholders (Naughton, 2015). In this regard, resolving vertical agency costs may come at the expense of larger horizontal agency costs.

## 3 Data Description

### 3.1 The SAIC Database

China's Business Registry Data provides cross-sectional information for every firm ever established in China on its date of establishment, its mainline of business, its location, and the firm's registered capital. The company name is encrypted, but a unique ID is provided to match with other databases. It also includes current shareholder information on paid-in capital and the latest investment date. In China, investors are classified as corporate investors, individual investors, or state investors. The data also provide unified IDs for corporate investors and individual investors. In 2019, the database contained information on nearly 44.4 million firms, of which 32.4 million were operating. For firms that were no longer in business, we know the date they went bankrupt or were liquidated. These data have recently used to examine networks of firms connected through equity investments (Bai et al., 2020).

A separate database maintained by SAIC provides information on changes in registry information, most importantly, paid-in capital and investors in these firms, which allows us to track M&A activity and changes in ownership. Since the Business Registry only includes the most recent information on shareholders, we need data on these changes to reconstruct each firm's investor history and ownership.[6] Ignoring these changes will lead

[6]In constructing the panel data on the registered capital and the largest shareholder of individual firms, we use detailed information on changes in registered capital over time. We thank The Center for Enterprise

to biased estimates of ownership, the paid-in capital of these enterprise groups in earlier years, as well as their growth over time.

SAIC also requires registered firms to report financial information annually for inspection purposes. This includes firm assets, liabilities, revenues, profits and taxes. We utilize access to these data for the period between 2008 and 2012 to assess firm performance.[7]

### 3.2 OFDI Database

China's Business Registry does not capture the overseas activity of Chinese firms. We draw on two databases that provide information on China's overseas foreign direct investment (OFDI), one maintained by the American Enterprise Institute, and the other by the Financial Times.[8] We link OFDI activity with enterprise groups based on either investors' names, or the name of the group.

### 3.3 Defining Control and Constructing Hierarchy

There are multiple ways to define "control" and ownership. In constructing the hierarchy of the business groups, we define control of each firm on the basis of the largest shareholder or investor (Altomonte and Rungi, 2013). We start at the top of the hierarchy with the parent of the group that has ultimate control. For example, in the case of China State Shipbuilding Group as shown in Figure 1, the parent firm (headquarter) is China State Shipbuilding Corporation(CSSC). We next identify all tier 1 subsidiaries in which the parent has direct control as majority investors in the firm, such as Jiangnan Shipbuliding Corp. and CSSC Ship Design Institution. Often, they have 100% of ownership. We then work our way down in a similar manner through the hierarchy to identify lower-tier firms, i.e. tier 2, 3, 4 firms in the groups. Figure 1 identifies four tiers in the context of CSSC. In any subsidiary, there can be multiple investors, both within and outside the group. Control is always identified by direct majority ownership however.

Research at Peking University for providing data on these changes.

[7] Digital collection of this information beginning in 2007 contributed to a significant increase in its coverage. In 2014, a self-reporting system was implemented. For quality reasons, we restrict our use to 2008-2012.

[8] Prof. Albert Park from the HKUST integrated the data from the two sources, eliminating duplicate records in the process. We thank Prof. Park for providing access.

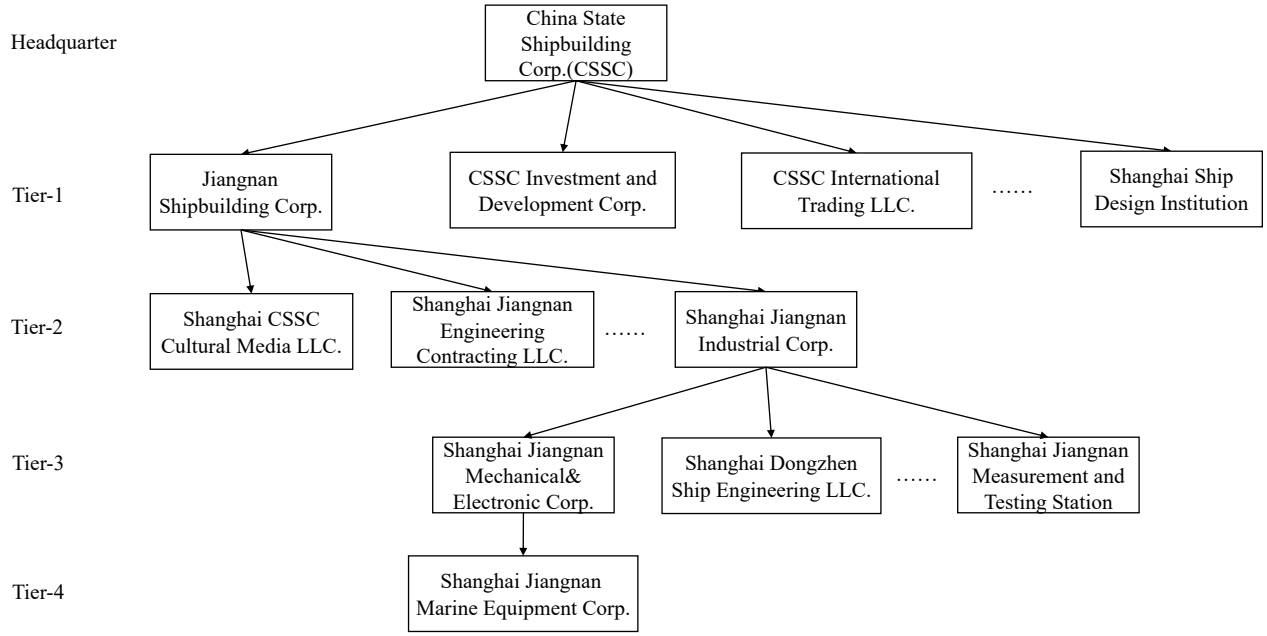



Figure 1. Pyramidal Structure of China State Shipbuilding Corp.

Source: National Enterprise Credit Information Publicity System (shiming.gsxt.gov.cn).

# 4 The Business Group under Central Government:2019

## 4.1 The Big Picture

Table 1 reports for 2019 the number of enterprise groups that are under central government control, the number of their subsidiaries, and their total registered capital. These groups include those under central SASAC, the State Council, and the Ministry of Finance. In total, there were 264 enterprise groups under central government control, which in turn controlled a total of 55,929 subsidiaries. Registered capital here refers to the total equity or capital contributions of shareholders of the firm. Altogether, the registered capital of groups under central government control was 36.5 trillion RMB, or nearly $US 5.6 trillion, of which more than half is under central SASAC and the rest under either the State Council or the Ministry of Finance. Nearly 80% of subsidiary are also under central SASAC. For reasons of data availability, much of the analysis that follows focuses on groups under Central SASAC.[9]

[9]Central SASAC annually publishes a list of enterprise groups under its control, which allows us to track M&A activity at the group level, and accurately link subsidiaries to individual groups. Similar information is not available in the public domain for groups under either the Ministry of Finance or the State Council.

Table 1. Size of Central SOEs in 2019

| Administration: | Business Group | Subsidiaries | Registered Capital (Trillion RMB) | | |
|---|---|---|---|---|---|
| | Number | Number | Headquarter | Subsidiary | Total |
| Central SASAC | 95 | 43,999 | 4.28 | 15.69 | 19.97 |
| Ministry of Finance | 23 | 7,300 | 4.15 | 3.27 | 7.42 |
| State Council | 144 | 4,630 | 2.57 | 6.52 | 9.09 |
| Total | 264 | 55,929 | 11.00 | 25.48 | 36.48 |

Source: Authors' calculations using the Business Registry.

### 4.2 Main lines of business of enterprise groups

We utilize self-reported information from tier-1 subsidiary in order to identify the main line of business of each group, which we summarize in Table 2.[10] Table 2 also provides a breakdown based on registered capital. Enterprise groups under central government control can be found in every major sector of the economy, with the share of total registered capital in the primary, second and tertiary sectors more or less proportional to the size of these sectors in the national economy. Under central SASAC, manufacturing and utilities dominate, followed by technical services, construction, and leasing and business services.[11] Groups under the Ministry of Finance are limited to banking and finance and leasing and business services, and in the case of the State Council, primarily transportation, finance, and manufacturing. In addition, there are more than a hundred enterprise groups under the State Council that are in cultural industry, including China Broadcasting Networking Corporation and China Publishing Group Corporation. At least measured in terms of registered capital, these groups are relatively unimportant.

As a result, we can provide only more aggregate pictures for the enterprise groups under these two in 2019.

[10]Each group's headquarters individually reports a main line of business, but this may not accurately reflect the industry of the business group. China Baowu Steel Group Corporation and China State Power Investment Corporation, for example, report that they are in the "business management service" industry. Thus, we use the 1-digit industry with the largest share of paid-in capital among first-tier firms of a business group to identify the business group's main business. This results in a reclassification for 2019 of the mainline of business for 18 of the 97 business groups. The detailed discussion is in Section 6.7.1. Technical service industry and R&D industry are in the same 1-digit industry. We separate them by using 2-digit industries in order to better reflect the industrial distribution.

[11]Prominent examples of groups under technical services include China Aerospace Science and Technology Corporation (technology promotion) and China National Petroleum Corporation (geological prospecting). Examples of groups under leasing and business service include China Reform Holdings Corporation, China Chengtong Holdings Group Inc., and Overseas Chinese Town Holdings Company (investment and asset management).

Table 2. Main Lines of Business of Central Enterprise Groups

| Industry | Number of Groups | | | | Share of Registered Capital (%) | | | |
|---|---|---|---|---|---|---|---|---|
| | SASAC | MOF | SC | Total | SASAC | MOF | SC | Total |
| Agriculture | 1 | 0 | 8 | 9 | 0.1 | 0.0 | 0.8 | 0.2 |
| Mining | 4 | 0 | 0 | 4 | 7.4 | 0.0 | 0.0 | 4.0 |
| Manufacturing | 24 | 0 | 2 | 26 | 19.6 | 0.0 | 5.1 | 12.0 |
| Utilities | 7 | 0 | 0 | 7 | 20.8 | 0.0 | 0.0 | 11.4 |
| Construction | 8 | 0 | 0 | 8 | 10.8 | 0.0 | 0.0 | 5.9 |
| Wholesale and Retail | 12 | 0 | 0 | 12 | 6.6 | 0.0 | 0.0 | 3.6 |
| Transportation | 6 | 0 | 2 | 8 | 4.3 | 0.0 | 83.1 | 23.1 |
| Catering | 0 | 0 | 1 | 1 | 0.0 | 0.0 | 0.0 | 0.0 |
| IT | 6 | 0 | 3 | 9 | 5.7 | 0.0 | 0.3 | 3.2 |
| Finance | 0 | 16 | 9 | 25 | 0.0 | 56.4 | 7.3 | 13.3 |
| Leasing and Business Service | 12 | 7 | 8 | 27 | 9.3 | 43.6 | 2.9 | 14.7 |
| Technical Service | 12 | 0 | 1 | 13 | 14.9 | 0.0 | 0.0 | 8.1 |
| R&D | 3 | 0 | 0 | 3 | 0.6 | 0.0 | 0.0 | 0.3 |
| Culture | 0 | 0 | 106 | 106 | 0.0 | 0.0 | 0.5 | 0.1 |
| Total | 95 | 23 | 140 | 258 | 100.0 | 100.0 | 100.0 | 100.0 |

Source: Authors' calculations using the Business Registry.

## 5 The Evolution of Business Groups, under Central SASAC

Since the early 2000s, there have been marked changes in the enterprise groups under central control, both in terms of their number and their internal structure. We begin by looking at the consolidation of resources among these groups–a major objective of state policy–focusing largely here on those under SASAC. Much less information is available for groups under either the Ministry of Finance or the State Council, and we save this discussion for the Appendix.

### 5.1 Changes in the Number of Headquarters

In Table 3, we report the total number of central SOE enterprise groups under Central SASAC in each year between 2003 and 2019. Over this period, the total number of groups declined from 186 to 97, or a reduction of nearly a half, with most of this occurring by 2011. Changes in the number of groups occurred for one of four reasons: 1. the internal acquisition or takeover of a group within the central SASAC; 2. formation of a new central enterprise group through the merger of two existing central enterprise groups; 3. the

Table 3. Changes in Groups under Central SASAC

| Year | No. | Net Change | Acquisition (-1) | Merger (-2+1) | New Entry (+1) | Exit (-1) |
|---|---|---|---|---|---|---|
| 2003 | 186 | – | – | – | – | – |
| 2004 | 178 | 8 | 9 | 1 | 2 | 0 |
| 2005 | 169 | 9 | 8 | 1 | 0 | 0 |
| 2006 | 159 | 10 | 8 | 1 | 0 | 1 |
| 2007 | 151 | 8 | 9 | 0 | 1 | 0 |
| 2008 | 143 | 8 | 6 | 3 | 1 | 0 |
| 2009 | 129 | 14 | 12 | 1 | 0 | 1 |
| 2010 | 122 | 7 | 7 | 1 | 1 | 0 |
| 2011 | 117 | 5 | 3 | 2 | 0 | 0 |
| 2012 | 116 | 1 | 2 | 0 | 1 | 0 |
| 2013 | 114 | 2 | 1 | 1 | 0 | 0 |
| 2014 | 113 | 1 | 1 | 0 | 0 | 0 |
| 2015 | 107 | 6 | 3 | 3 | 0 | 0 |
| 2016 | 103 | 5 | 3 | 2 | 1 | 0 |
| 2017 | 99 | 4 | 3 | 1 | 0 | 0 |
| 2018 | 97 | 2 | 1 | 1 | 0 | 0 |
| 2019 | 97 | 0 | 1 | 1 | 2 | 0 |

Source: SASAC website and China State-owned Assets Supervision and Administration Yearbook.

establishment of an entirely new enterprise group by SASAC; and 4. bankruptcy of an enterprise group, or the transfer of control outside of central SASAC, but within the central government, i.e. either to the State Council or to a central ministry. With the exception of bankruptcy, none of these changes resulted in a reduction in assets under central control.

Above all, the most important reason for the change in the number of enterprise groups was takeovers (-77), followed by the reorganization of two existing groups into a new group (-19). Much less important was the establishment of entirely new enterprise groups (+9), and then either bankruptcy or transfer of control outside of SASIC (-2). Acquisitions and mergers at the group level served two primary purposes: 1. consolidation of groups within the same line of business; and 2. vertical integration of groups upstream and downstream in the value chain. In principle, M&A helped to expand the capabilities within the group and increase their domestic and global market power by reducing competition and eliminating excess capacity. Through M&A, successful groups acquired their less successful and often unprofitable counterparts. Large downstream manufacturing groups also acquired key intangible assets through M&A with national research institute groups. Table 4 provides prominent examples of both.

Table 4. Examples of M&A for Horizontal Consolidation and Vertical Integration

- **Industry Consolidation**

  2005: China Harbour Engineering Company (CHEC) and China Road and Bridge Corporation (CRBC) merged to form China Communication Construction Corporation.

  2009: China United Telecommunications Corporation and China Netcome Corporation became China Unicom Corporation.

  2015: The China Southern Railway (CSR) and China Northern Railway (CNR) formed a new enterprise group CRRC Corporation Limited.

  2016: Baowu Steel Group was formed through the merger of Baoshan Iron and Steel Group with Wuhan Iron and Steel Group

  2016: China Shipbuilding Industry Corporation and China State Shipbuilding Corporation combined to form China Shipbuilding Group.

- **Integration**

  2004: China Light Industry Machinery Corporation merged with China National Building Materials Group.

  2005: China Petro acquired China Huanqiu Contracting and Engineering Corp.

  2007: China Petro acquired China Textile Industrial Engineering Institute.

  2010: China National Pharmaceutical Group Corporation acquired Shanghai Institute of Pharmaceutical Industry.

  2017: China Guodian (electricity) and Shenhua Energy corporation (coal production) are combined to form China Energy Company.

### 5.2 Changes in the Number and Registered Capital of Subsidiaries

Consolidation contributed to larger groups, but the groups also expanded internally. Table 5 reports for select years (2003, 2007, 2011, 2015 and 2019) the total number of subsidiaries of those groups under central SASAC.[12] Over this sixteen-year period, the total number of subsidiaries under central SOEs of SASAC almost doubled from 22,338 in 2003 to 43,999 in 2019, or at an annual growth rate of 4.3%. Per group, the average number of subsidiaries expanded from 133 in 2003 to 468 by 2019. Of this increase, approximately a third is the product of the consolidation of groups under SASAC, and two-thirds the

[12]There are a small number of groups whose headquarters we cannot find in the Business Registry, and thus for whom we cannot identify subsidiaries.

result of the increase in the total number of subsidiaries under SASAC.[13]

Table 5. Enterprise Groups and Subsidiary under Central SASAC

| Year | Enterprise Groups | | | | Subsidiary | | Average over All Groups | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | Identified | Have at least one subsidiary | Have at least one listed firm | Total | Listed firms | Number of subsidiaries | Number of listed firms | Hierarchy length |
| 2003 | 186 | 172 | 168 | 68 | 22,338 | 140 | 133.0 | 2.1 | 3.6 |
| 2007 | 151 | 145 | 145 | 72 | 27,234 | 189 | 187.8 | 2.6 | 4.0 |
| 2011 | 117 | 113 | 113 | 79 | 32,887 | 245 | 291.0 | 3.1 | 4.6 |
| 2015 | 108 | 104 | 103 | 81 | 39,250 | 267 | 381.1 | 3.3 | 4.8 |
| 2019 | 97 | 95 | 94 | 77 | 43,999 | 304 | 468.1 | 3.9 | 5.5 |

Note: At the group level, "Total" is the number of headquarters listed under SASAC, most of which we can find in the Business Registry database (shown in the column 'Identified'). We report the number of headquarters that have at least one subsidiary and one listed firm. Listed firms refer to firms on either the Shanghai, Shenzhen, HK or US stock exchanges. For subsidiaries, we report the total number of subsidiaries and listed firms by year. We report the average number of subsidiaries, listed firms, and hierarchy length at the group level.

The increase in the total number of subsidiaries reported in Table 5 conceals multiple forces shaping the internal structure of these groups. The number of subsidiaries expanded through new acquisitions by groups, as well as through the establishment of entirely new subsidiaries. At the same time, the number contracted through liquidation or bankruptcy, and the sale of subsidiaries to other enterprises.[14] These changes were tied to individual group objectives relating to vertical integration, market concentration, acquisition of key technology, profitability, and risk diversification. Table 6 provides more detailed information. Between 2004 and 2019, an average of 3901 subsidiaries were added annually through acquisitions and the establishment of new subsidiaries within the group. This was offset by the sale or liquidation of 2547 subsidiaries per year, resulting in a net annual increase of 1354 subsidiaries, which implies an annual increase of 4.3%. A key insight from Table 6 is that changes in the total number of subsidiaries within these groups conceal significant restructuring of state-owned assets through multiple channels.

Panel B of Table 6 reports related information on registered capital. The key difference

[13] In Appendix Tables A1 and A2, we report the same tables for groups under the Ministry of Finance and the State Council based on a balanced panel of groups in 2019. The growth in the number of subsidiaries in groups under the MOF is even faster than the SASAC, but significantly slower in the case of those under the State Council.

[14] Since we are interested at this point in the groups under Central SASAC as a single entity, acquisitions only include additions of subsidiaries that were not already part of other enterprise groups under central SASIC. Exit here represents the decision of the group to dissolve formally the subsidiary.

from panel A is that the registered capital of the group can also increase with additions to the registered capital of existing subsidiaries in the group. Between 2003 and 2019, the registered capital of the enterprise groups under central SASAC increased four-fold from 3.10 trillion RMB to 15.69 trillion, implying an annual growth rate of 10.7 percent. Growth was similar between sub-periods. The largest increase was in the registered capital of existing subsidiaries (incumbents), followed by the increase through the establishment of new subsidiaries, and finally mergers and acquisitions. The contributions of these three sources to the growth of registered capital were 37.5, 34.8, and 27.5 percent, respectively. To help put the growth in registered capital in these state-owned groups in perspective, the paid-in-capital of all firms in China with incorporated investors increased at an annual rate of 13.2% between 2003 and 2019, implying a decline in the share in groups under central SASAC.

## 6 Organization within Groups, under Central SASAC

Changes in the internal structure of business groups accompanied their rapid expansion. A critical dimension in this regard is the number of levels or tiers – a smaller (larger) number of levels is associated with flatter (longer) hierarchies – and the distribution of subsidiaries along these tiers. The role of listed firms in these hierarchies is also important. Recall from Table 5 that the average hierarchy length increased from 3.6 to 5.5 tiers between 2003 and 2019. Over the same period, the number of listed firms in these groups more than doubled from 140 to 304, with growth slowing after 2011.

### 6.1 Role of Hierarchy

Panel A of Table 7 reports information on the total number of subsidiaries and total registered capital of subsidiaries by tier for select years. We group subsidiaries in tier 4 and below into a single category. Tier 1 subsidiaries are those immediately under headquarters. Panel B reports the same information in terms of shares. In 2003, the 2,936 tier 1 subsidiaries represented 13.1% of the total number of subsidiaries and held 69.0% of group registered capital. By 2019, their shares fell to 5.4% and 36.1%, respectively. In absolute terms, their total number actually dropped by a fifth to 2,391 subsidiaries in 2019, reflecting a consolidation at the top of these hierarchies accompanying the reduction in the total number of groups under central SASAC. This decline in tier-1 subsidiaries was offset by the rapid growth of lower-tiered subsidiaries, especially in tiers 3 and below, which nearly tripled in number. By 2019, these subsidiaries represented nearly 70% of

Table 6. Sources of Change in Subsidiaries of Groups

Panel A: Changes in the Number of Subsidiaries

| Year | Total | Incumbents | Changes in the Past 4 years | | | | |
|---|---|---|---|---|---|---|---|
| | | | Net Change | New (+1) | Acquired (+1) | Liquidated (-1) | Sold (-1) |
| 2003 | 22,338 | | | | | | |
| 2007 | 27,234 | 16,888 | 4,896 | 6,119 | 4,227 | 4,456 | 994 |
| 2011 | 32,887 | 20,984 | 5,653 | 7,255 | 4,648 | 4,674 | 1,576 |
| 2015 | 39,250 | 27,040 | 6,363 | 9,027 | 3,183 | 3,765 | 2,082 |
| 2019 | 43,999 | 26,821 | 4,749 | 12,091 | 5,087 | 8,476 | 3,953 |
| Annual Change(%) | | | 4.33 | 6.38 | 3.47 | -4.73 | -1.71 |

Panel B: Changes in Registered Capital

| Year | Total (trillion Yuan) | Growth (trillion Yuan) | Contribution to Growth (% of Growth) | | | | |
|---|---|---|---|---|---|---|---|
| | | | Incum-bents | New | Acquired | Liquidated | Sold |
| 2003 | 3.10 | | | | | | |
| 2007 | 4.51 | 1.41 | 15.35 | 65.23 | 33.51 | −7.18 | -6.91 |
| 2011 | 6.77 | 2.26 | 26.34 | 59.13 | 30.56 | −11.43 | -4.60 |
| 2015 | 9.86 | 3.09 | 41.00 | 48.04 | 19.48 | −3.11 | -5.41 |
| 2019 | 15.69 | 5.83 | 47.71 | 45.56 | 25.05 | −10.05 | -8.28 |
| Average | | | 32.60 | 54.49 | 27.15 | −7.94 | -6.30 |

Note: Incumbents in year t refer to firms that were established at least four years earlier and operated in year t. Net change is the change in the number of firms between t and t-4, and is the sum of the net changes in year t-3, t-2, t-1, and t. New denotes firms newly established by the group from t-3 to t. Acquired denotes firms which were established before t-3 and acquired by the group from t-3 to t. Liquidated denotes subsidiaries of group in year t-4 which were closed in period t-3 - t. Sold denotes subsidiaries of group in year t-4 which were sold by group in period t-3 - t. In each year t, we compute the annual contribution of each source separately as the annual growth in a 4-years period. The simple average of annual growth is reported in the last row.

all subsidiaries. Moreover, there were 6.3 subsidiaries in tier 4 and below for every tier 1 subsidiary compared to a ratio of 1.1 in 2003. Over the same period, the share of registered capital for subsidiaries in tier 4 and below increased from only 5.3% of the total to 29.7%. In short, the hierarchies of business groups under SASAC have become more pyramid-like as they increased in length (more tiers) and became wider at the bottom (more subsidiaries in lower tiers). Much of the analysis that follows tries to understand the forces behind the rapid growth in hierarchy.

Table 7. Number and Share of Subsidiaries, by Tier

| Panel A | Total number of subsidiaries | | | | | Total registered capital of subsidiaries (Trillion yuan) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Level | 2003 | 2007 | 2011 | 2015 | 2019 | 2003 | 2007 | 2011 | 2015 | 2019 |
| 1 | 2,936 | 2,988 | 2,714 | 2,737 | 2,391 | 2.14 | 2.65 | 3.42 | 4.21 | 5.67 |
| 2 | 9,215 | 10,295 | 11,473 | 12,524 | 12,034 | 0.80 | 1.37 | 2.22 | 3.42 | 5.36 |
| 3 | 6,950 | 8,797 | 10,961 | 12,901 | 14,587 | 0.13 | 0.35 | 0.78 | 1.53 | 3.05 |
| 4+ | 3,237 | 5,154 | 7,739 | 11,088 | 14,987 | 0.04 | 0.14 | 0.34 | 0.68 | 1.61 |
| Total | 22,338 | 27,234 | 32,887 | 39,250 | 43,999 | 3.10 | 4.51 | 6.77 | 9.85 | 15.69 |
| Panel B | Share by tiers (%): number | | | | | Share by tiers (%): registered capital | | | | |
| Level | 2003 | 2007 | 2011 | 2015 | 2019 | 2003 | 2007 | 2011 | 2015 | 2019 |
| 1 | 13.14 | 10.97 | 8.25 | 6.97 | 5.43 | 69.01 | 58.87 | 50.60 | 42.79 | 36.12 |
| 2 | 41.25 | 37.80 | 34.89 | 31.91 | 27.35 | 25.66 | 30.37 | 32.88 | 34.71 | 34.15 |
| 3 | 31.11 | 32.30 | 33.33 | 32.87 | 33.15 | 4.04 | 7.74 | 11.51 | 15.56 | 19.45 |
| 4+ | 14.49 | 18.92 | 23.53 | 28.25 | 34.06 | 1.29 | 3.03 | 5.01 | 6.94 | 10.28 |
| Total | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

Source: Authors' calculations using the Business Registry.

### 6.2 Role of Listed Firms

Table 8 reports complementary information for groups under central SASAC relating to the number and registered capital of listed firms and the subsidiaries under their control. Listed firms include those that went public either domestically or overseas. Between 2003 and 2019, the number of listed companies increased from 140 to 304, while the number of subsidiaries under their control expanded from 1,852 to 19,576.[15] Combined, listed companies and their subsidiaries went from representing only 8.6% of the total number of subsidiaries in these groups in 2003 to 46.3% in 2019. Their share of registered capital increased less rapidly, but rose by a factor of 2.7 from 16.6 percent in 2003 to 45.2 percent of the total capital in these group in 2019 as shown in the last two columns of Table 8. Note also that most of the increase in subsidiaries in the group occurred through the rapid growth in the subsidiary of listed firms. This has obvious implications: Over time, the performance of a group increasingly reflected that of the listed companies, and especially those firms under their direct control. Table 9 captures the evolving structures of the pyramids under the listed companies, which are slightly flatter than those of the entire group.

Table 8. Role of Listed Companies in Group, by Year

| Year | Total number | | | Share of total number (%) | | | Share of total capital(%) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Non listed | Listed | Subsidiary, listed | Non listed | Listed | Subsidiary, listed | Non listed | Listed | Subsidiary, listed |
| 2003 | 20,346 | 140 | 1,852 | 91.1 | 0.6 | 8.3 | 83.3 | 10.6 | 6.0 |
| 2007 | 22,098 | 189 | 4,947 | 81.1 | 0.7 | 18.2 | 71.9 | 15.1 | 13.1 |
| 2011 | 22,744 | 245 | 9,898 | 69.2 | 0.7 | 30.1 | 64.3 | 13.3 | 22.4 |
| 2015 | 25,304 | 267 | 13,679 | 64.5 | 0.7 | 34.9 | 60.1 | 10.6 | 29.3 |
| 2019 | 24,119 | 304 | 19,576 | 54.8 | 0.7 | 44.5 | 54.8 | 8.7 | 36.5 |

Source: Authors' calculation based on Wind Listed Firm Data and the Business Registry. "Listed" firms are subsidiaries of groups under central SASAC which are listed on either the domestic, HK, or the US stock market. "Subsidiary, listed" are non-listed subsidiaries controlled by "Listed" firms directly or indirectly. If listed firm A is a subsidiary of listed firm B, it is regarded as "Listed" rather than "Subsidiary, listed".

[15] Among the 304 listed firms, 289 listed in either the Shanghai or Shenzhen stock market.

Table 9. Structure of Sub-groups under Listed Companies

| Period: | 2003 | | 2007 | | 2011 | | 2015 | | 2019 | | 03-19 | 03-11 | 11-19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variable: | # | share (%) | # | share (%) | # | share (%) | # | share (%) | # | share (%) | annual growth (%) | | |
| Listed | 140 | – | 189 | – | 245 | – | 267 | – | 304 | – | 5.0 | 7.2 | 2.7 |
| Tier 1 | 1,094 | 59.1 | 2,180 | 44.1 | 3,388 | 34.2 | 3,919 | 28.6 | 5,224 | 26.7 | 10.3 | 15.2 | 5.6 |
| Tier 2 | 601 | 32.5 | 1,811 | 36.6 | 4,441 | 44.9 | 6,470 | 47.3 | 9,171 | 46.8 | 18.6 | 28.4 | 9.5 |
| Tier 3 | 126 | 6.8 | 730 | 14.8 | 1,731 | 17.5 | 2,720 | 19.9 | 3,780 | 19.3 | 23.7 | 38.8 | 10.3 |
| Tier 4+ | 31 | 1.7 | 226 | 4.6 | 338 | 3.4 | 570 | 4.2 | 1,401 | 7.2 | 26.9 | 34.8 | 19.5 |

Source: Authors' calculation based on Wind Listed Firm Data and the Business Registry. Tier is defined in terms of the sub-group under listed firms. Share is reported in percentage terms and sums to 100 percent over all tier.

### 6.3 Listed firms and group expansion

The increase in the number of subsidiary under listed firms reflects two possible forces at work: (i) a shift of existing subsidiaries in the group to control by the new listed entity with no overall effect on the total number of group subsidiary; and (ii) the establishment of new subsidiary causally linked to the setting up of the new listed company through access to new sources of finance. In the latter case, such an increase could occur either under the listed company or outside elsewhere in the group. In both cases however, mobilization of capital through the establishment of the listed company is critical to the expansion.

To estimate the "treatment" effect of a new listed company on the total number of subsidiary in the group, we carry out an event study analysis. Conventional event study estimates with two-way fixed effects (in our setting, one for the group, and the other for time) are potentiallhy biased due to different calendar time and period fixed effects. To address these problems, we estimate a difference-in-difference model with staggered roll-out, which accommodates settings in which units in the panel receive treatment at different times. Estimation is also robust to heterogenous treatment effects.[16] Treating the establishment of the new listed firm in a group as time "0", the top half of Figure 2 shows the estimated average treatment effect, i.e. the difference between the treated group and the counterfactual for the control group, of establishing a new listed company in the five-year window following its establishment. The histogram at the bottom is the number of business groups in the treated group.

The key insight that emerges is the significant increase over time in new subsidiaries

[16]For details, see Borusyak et al. (2024) and Liu et al. (2024).

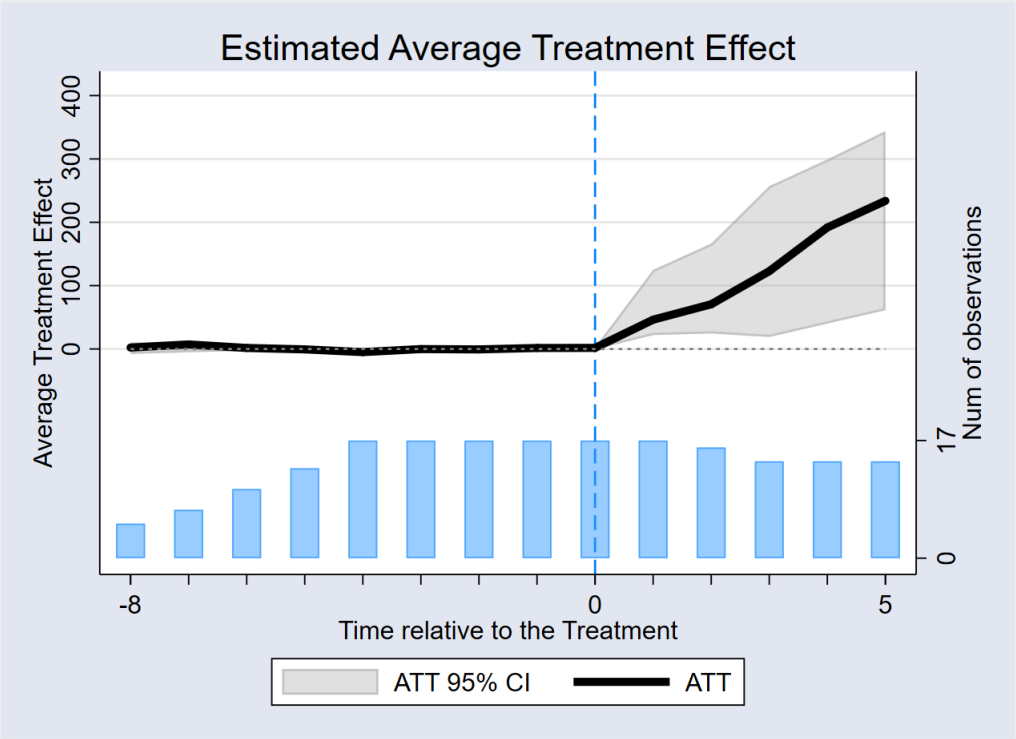



Figure 2. Effects of Having Listed Firms on the Total Number of Subsidiaries

Note: The figure plots coefficients and their 95% confidence intervals. The dependent variable is the log number of subsidiaries of each group. The independent variable is a dummy variable that indicates if the group has at least one listed firms in a given year. 1 is the first year that group has the first listed firms. Time 0 is the omited group. Group fixed effects and year fixed effects are included. Standard errors are clustered at the group level.

associated with the establishment of a new listed company within the group. Our estimates suggest that setting up a new listed company within a group results in an increase of more than 200 new subsidiary compared to a group that does not. The fact that the difference is zero before treatment indicates that the counterfactual estimates based on the control group fit the treatment group well, and that the difference after treatment is the causal effect of establishing a listed company.[17]

### 6.4 Minority Investors Throughout the Hierarchy

Focusing solely on control within a hierarchy conceals the role of minority investment in a group by other enterprises and individuals. Lin and Milhaupt (2013), Leutert (2018), and Bai et al. (2020) argue that a state-owned business group is not an isolated network but

[17]Non-parallel trends of treated and untreated groups can bias estimates. The horizontal line before treatment is indicative of parallel trends for the two groups.

connected to other groups and firms through ownership, personnel ties, and financing. Investments may also cross ownership lines, i.e. private investment in SOEs as well as the opposite, and help to expand the "mixed" economy which has been promoted. Mixed ownership was endorsed at the 3rd Plenum of the the 18th Central Committee in 2013 and received additional support from the State Council in 2015.[18] These investments can serve multiple purposes. Private investment in SOEs may provide needed financial discipline and expertise. Equity investment can also help to reduce holdup problems in supplier relationships and strengthen the incentives of individual managers (Williamson, 1979). On the other hand, investments by other subsidiary in the group or other SOE may be used to support poorly performing subsidiaries, and facilitate the redistribution of the rents within the group or to outsiders.

Table 10 provides a breakdown of the role of minority investors for select years for enterprise groups under SASAC. For each of these years, we report the number of subsidiaries with minority investors, and the number of subsidiaries by type of minority investor. We distinguish here between investment by investors outside the group, and that by other subsidiaries within the group. Outside investors can be either private, foreign, or state. Private includes the registered capital held by private individuals as well as by private enterprises.[19] Since a firm may have more than one type of minority investor, the sum of columns (3) through (6) exceeds the number reported in column (1). Between 2003-2019, 35-40% of all subsidiaries had minority investors. Moreover, a majority of these investors were outside the group, with private investors becoming slightly more prominent over time.

Table 11 provides more detailed data for 2019 on the role of minority investors by the tier of subsidiaries. Among tier 1 subsidiaries, 27.5 percent have minority investors, with SOEs outside the group the most frequent source of investment.[20] In lower-tiers, minority investors are much more frequently observed, especially private investors. For those subsidiaries in tier 4 and below, 42.3% have minority investors, with 61.2% of these subsidiaries having private investment.

In terms of paid-in capital, there are two useful ways of looking at how important outside ownership is. First, we can compute the share of registered capital over all

[18] See, for example, State Council, "Opinion on the Development of the Mixed Ownership Economy by State Enterprises", 2015.

[19] In principal, registered capital held by a private individual could also be that by an individual that works within the firm, e.g. the top manager(s). Investor data in the Registry Database do not allow us to establish these ties.

[20] Since a subsidiary may have more than one type of small investor, the sum of the shares by type of investors exceeds the total share.

Table 10. Role of Minority Investors, by Year

| Year | Firms with minority investors | | By type of minority investors | | | |
|---|---|---|---|---|---|---|
| | Number | Share (%) | Private | Foreign | SOE | Subsidiary within group |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| 2003 | 9,678 | 43.3 | 4,047 | 987 | 5,089 | 1,496 |
| 2007 | 10,782 | 39.6 | 5,003 | 1,176 | 5,022 | 1,966 |
| 2011 | 12,028 | 36.6 | 5,820 | 1,292 | 5,308 | 2,474 |
| 2015 | 14,319 | 36.5 | 7,176 | 1,482 | 5,697 | 3,336 |
| 2019 | 18,395 | 41.8 | 9,604 | 1,804 | 7,406 | 4,130 |

Note: Minority investors can be individuals, incorporated firms, or unincorporated entities. They have smaller shares than the largest shareholder. Individuals are grouped with "private" and unincorporated entities are grouped with "SOE". Incorporated firms are grouped based on the ownership type of their ultimate controllers, which is identified by tracing up through the shareholder hierarchy.

subsidiaries; and second, we can estimate the share conditional on a subsidiary having outside investment, which then provides an estimate of the role of outside owners only among those subsidiaries in which there is outside investment. Estimated over all subsidiaries, the share of paid-in capital of minority investors is 16.4%, i.e. 100 - 83.6%, with the share in lower tiered subsidiaries (19.8%) significantly higher than in tier 1 subsidiaries (11.7%). On the other hand, estimated only over those subsidiaries with outside investment, the share is 35.7% percent, with much smaller differences observed in the role of these investors at the top and bottom of the hierarchy, i.e., 31.2% vs 36.9%. However, in lower tiers the share of registered capital of non-state, i.e., private and foreign, investors is almost two times larger than it is at the top (17.8% vs 10.3%).

### 6.5 Cash Right Leverage

The relationship between control and cash flow rights is an important lens through which to study corporate governance (La Porta et al., 1999). Control rights are the fraction of control or voting rights held by an investor. Cash rights are the fraction of the firm's registered capital held by an investor and thus the share of a firm's profits the investor is entitled to. Through pyramids with minority outside investment in lower tiers, the ultimate controller of the group is able to leverage their investments to control more assets.[21] In lower-tier subsidiaries, their voting rights exceed their cash rights. In principle, a large

[21]This explanation for the pyramid structure of big companies in East Asia is well discussed in Claessens et al. (2000).

Table 11. Role of Minority Investors, by Tier (2019)

Panel A: Share of firms with minority investors

| Level | Total share(%) | Share by type of small investors(%) | | | |
|---|---|---|---|---|---|
| | | Private | Foreign | SOE | Subsidiaries within group |
| 1 | 27.5 | 10.9 | 5.3 | 16.1 | 11.7 |
| 2 | 43.0 | 20.2 | 5.0 | 20.8 | 9.7 |
| 3 | 42.7 | 20.7 | 4.2 | 18.4 | 10.2 |
| 4+ | 42.3 | 25.9 | 3.0 | 12.3 | 8.0 |
| Overall | 41.8 | 21.8 | 4.1 | 16.8 | 9.4 |

Panel B: Share of paid-in capital by type of investors (%)

| Sample: | All firms | | | | | Firms with minority investors | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Type of investors: | Controller | Private | Foreign | SOE | Subsidiary within group | Controller | Private | Foreign | SOE | Subsidiary within group |
| 1 | 88.3 | 1.4 | 2.5 | 5.1 | 2.7 | 68.8 | 3.6 | 6.7 | 13.8 | 7.1 |
| 2 | 80.6 | 3.2 | 2.5 | 9.6 | 4.2 | 62.1 | 6.2 | 4.9 | 18.7 | 8.1 |
| 3 | 82.3 | 4.1 | 2.1 | 7.3 | 4.2 | 62.7 | 8.7 | 4.5 | 15.4 | 8.8 |
| 4+ | 80.2 | 7.2 | 2.3 | 6.6 | 3.7 | 63.1 | 13.5 | 4.3 | 12.2 | 6.9 |
| Overall | 83.6 | 3.1 | 2.4 | 7.2 | 3.6 | 64.3 | 6.8 | 5.3 | 15.8 | 7.8 |

Source: Investor types are identified using the Business Registry Data.

separation between cash rights and control rights allows insiders, i.e. controlling shareholders and managers, who control corporate assets to expropriate outsiders, i.e. minority investors, giving rise to a lower firm value (Claessens et al., 2000). This can be done by either diverting resources for their personal use or by committing funds to unprofitable projects that also provide private benefits. In both cases, insiders benefit without bearing the full cost of their actions. This agency problem is more severe in countries with weaker legal regimes (La Porta et al., 1998), and in state-owned firms since the ultimate controller and the regulators are both the state.

As captured by Table 7, pyramids are a prominent feature of SOE business groups. Throughout the hierarchy, headquarters can invest in subsidiaries that have small minority investors but remain the largest shareholder. In lower-tiered subsidiaries, they are able to maintain their control over assets but with a much smaller amount of equity, implying a growing separation between their control and cash flow rights. Following Lemmon and Lins (2003), we estimate the degree of separation between cash and control rights for

each subsidiary of central SOEs. Assuming that the largest shareholder of a subsidiary at tier j controls share $s_j$, the cash right of the headquarters in that subsidiary should be $c_j = s_j * s_{j-1} ... * s_1$.[22] Since the ultimate controller controls the largest shareholder, it has a control right of $s_j$ and a cash right of $c_j$ of a given subsidiary. In Lemmon and Lins (2003), their measure of cash right leverage is then defined as $s_j$ over $c_j$ to capture the above separation.

Table 12. Cash Right Leverage, by Tier

| Year | Tier 1 | Tier 2 | Tier 3 | Tier 4 | Total |
|---|---|---|---|---|---|
| 2003 | 1.000 | 1.282 | 1.755 | 2.449 | 1.122 |
| 2007 | 1.000 | 1.368 | 1.969 | 3.900 | 1.275 |
| 2011 | 1.000 | 1.602 | 2.361 | 4.734 | 1.542 |
| 2015 | 1.000 | 1.585 | 2.429 | 4.873 | 1.694 |
| 2019 | 1.000 | 1.449 | 2.093 | 3.546 | 1.627 |

Note: Cash right leverage is calculated at the subsidiary level as the ratio of control rights over the cash flow rights. The average cash right leverage at the tier and group level weights leverage at the subsidiary level by registered capital.

In Table 12, we report the leverage ratio for tiers 1-4 at four year intervals for the period between 2003 and 2019. The leverage ratio equals 1 for tier-1 subsidiaries, and increases by tiers as headquarters invest jointly with minority investors in each tier. In the last column, we report the average of total cash right leverage for all subsidiaries, using as weights the registered capital of each subsidiary. The average leverage ratio of central SOEs increases from 1.122 in 2003 to 1.627 in 2019. 1.627 means that, on average, the headquarters of central SOEs can control assets worth 1.627 yuan with 1 yuan of registered capital.

Compared with the leverage ratio of listed companies in East Asia reported by Lemmon and Lins (2003), e.g. Hong Kong, 1.49, Malaysia, 2.48, and Singapore, 3.11, leverage in central SOEs as late as 2019 is low. Recall that high leverage is the result of many intermediate subsidiaries with minority investors. In the case of China's central SOEs however, nearly 60 percent of subsidiaries that are at level two or below are wholly owned by a single investor; moreover, 80 percent of all shares are owned by the largest investor or controller (see Tables 10 and 11). This suggests that the use of pyramids to control more assets is probably not the reason why Chinese SOE groups have so many layers and sub-

[22] We assume that the share of paid-up capital is equal to the share of voting rights. According to Claessens et al. (2000); Lemmon and Lins (2003), shares with superior voting rights are almost never employed in East Asian countries.

sidiaries. The cost of supervision at lower levels is also high. In all likelihood, lower-tier subsidiaries are not established from the top down, but reflect incentives and actions of insiders lower down in the hierarchy.

### 6.6 Outside Investments by Groups

So far we have focused on minority investors in subsidiaries within the group. Subsidiaries within the groups also have non-controlling investments in firms outside the group. Table 13 provides information on these investments in 2019, which totaled 15,722. Especially prominent are outside investments by tier 2 and 3 subsidiaries in the group. More than half of the time the investments are in other SOEs, followed by investments in private firms in a third of the cases. Foreign firms are less likely to be the targets of these investment, and represent less than fifteen percent of the cases. In value terms, investments in other SOEs dominate, and represent two-thirds of the total.

Table 13. Investments as Minority Investors, by Tier

| Small investment tier | Number by ownership of invested firms | | | | | Total investment by ownership of invested firms (Trillion Yuan) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Private | Foreign | SOE | Subsidiary within group | Total | Private | Foreign | SOE | Subsidiary within group | Total |
| 1 | 125 | 94 | 233 | 140 | 592 | 0.021 | 0.019 | 0.192 | 0.032 | 0.265 |
| 2 | 1,143 | 514 | 1,409 | 1,028 | 4,094 | 0.065 | 0.052 | 0.213 | 0.228 | 0.559 |
| 3 | 1,676 | 636 | 1,934 | 1,539 | 5,785 | 0.040 | 0.059 | 0.135 | 0.134 | 0.369 |
| 4 | 1,146 | 412 | 1,021 | 803 | 3,382 | 0.026 | 0.028 | 0.048 | 0.026 | 0.127 |
| 5+ | 672 | 168 | 382 | 506 | 1,728 | 0.085 | 0.012 | 0.023 | 0.012 | 0.132 |

Note: Authors' calculations using the Business Registry. The tier is defined as the tier of investors in the group plus 1. The headquarter is at tier-0, so the table starts from tier 1. We don't include the indirect investments since minority investors could not benefit directly from those indirect subsidiaries.

Table 14 helps assess how these investments have changed since 2003, and reports the number of other firms that group subsidiary invested in, the total value of these investments, and finally, their share of the total registered capital of these firms.[23] Between 2003 and 2019, the number of other firms that groups under central SASAC invested in almost doubled from from 7,957 to 15,722 and their investment rose more than six-fold from 0.27 trillion to 1.73 trillion RMB. Their share of registered capital in these firms also rose from

[23] In contrast to Table 13, we report the number of firms rather than the number of investments. Since we drop duplicate cases in which two or more firms within a group invested in same firm, the number of firms invested in reported in Table 13 is less than the number of investments in Table 12.

Table 14. Investments as Minority Investors, by Year

| Year | Number | Investment (trillion Yuan) | Share of registered capital (%) |
|---|---|---|---|
| 2003 | 7,957 | 0.27 | 10.9 |
| 2007 | 8,859 | 0.48 | 12.0 |
| 2011 | 9,554 | 0.71 | 12.8 |
| 2015 | 11,502 | 1.02 | 13.5 |
| 2019 | 15,722 | 1.73 | 16.8 |

Note: Share of registered capital is calculated as investment of groups as minority investors divided by the total registered capital of invested firms.

11.1% to 16.7%. The growth in non-controlling investment outside the group parallels the rapid expansion within the group captured in Table 7 in terms of the total number of subsidiary and registered capital.[24]

### 6.7 Business Scope and Vertical Integration

Enterprise groups expanded both vertically (number of tiers) and horizontally (number of subsidiaries per tier). What about their business activity? Has this expansion in numbers been accompanied by changes in a group's business scope? In their degree of vertical integration? Business scope here refers to the total number of lines of business the group is involved in. Vertical integration on the other hand is a measure of the group's control over production and distribution through the value chain of its main line(s) of business.[25]

#### 6.7.1 Business Scope

We provide two measures of business scope, the first based on the main lines of business of a group's tier-1 subsidiaries, and the second on the total number of lines of business of the entire group. Lines of business for each subsidiary are assigned at the 2-digit level.[26] For enterprise groups under SASAC, Table 15 reveals a significant increase in the number of lines of business at the tier-1 level from 7.2 lines in 2003 to 9.2 in 2019. This works out to a unique 2-digit line of business for every 2.7 tier one subsidiary in 2019. The increase

[24]Between 2003 and 2019, the number of subsidiary controlled by the group grew at an annual rate of 4.3% as did the number of firms outside the group in which they had minority investments. In value terms, "minority" investment outside the group expanded at an annual rate of 12.3% compared to 10.7% within.

[25]In principle, individual firms or subsidiaries may be involved in multiple lines of business, and a measure of vertical integration could also be computed capturing the relationship between these lines of business. In our data however, only the main line of business is reported for each subsidiary.

[26]At the 2-digit level, there are 96 sectors.

is accompanied by a reduction in the role of the group's most important line of business, measured here in terms of the percentage of tier-1 capital in this line of business. Between 2003 and 2019, the share of registered capital in tier-1 subsidiaries in a group's main lines of business fell from 63.7% to 59.3%. Even larger increases in business scope are seen from the perspective of the entire group in Table 15, with business scope increasing by more than three-quarters from 20.5% to 36.4%. This implies that in 2019 a typical business group was involved in more than a third of all 2-digit sectors. This behavior suggests that the establishment of new subsidiaries as well as M&A activity (see Table 6) have been major vehicles for entry by these groups into new lines of business, and dominate any effects in the opposite direction tied to the sale or liquidation of an existing subsidiary.

Table 15. Business Scope of Groups, by Year

| Year | Tier-1 subsidiary | | | | | Entire group | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | # of lines | Percentage of capital(%) | | | | # of lines[1] | Percentage of capital(%) | | | |
| | | Top1 | Top2 | Top3 | Other | | Top1 | Top2 | Top3 | Other |
| 2003 | 7.2 | 63.7 | 19.3 | 8.1 | 8.9 | 20.5 | 55.5 | 18.7 | 9.4 | 16.5 |
| 2007 | 7.9 | 62.4 | 18.2 | 9.1 | 10.2 | 24.6 | 52.7 | 17.8 | 10.0 | 19.6 |
| 2011 | 8.7 | 61.6 | 17.8 | 8.7 | 11.9 | 30.8 | 48.3 | 16.9 | 9.5 | 25.3 |
| 2014 | 9.1 | 60.2 | 17.6 | 8.8 | 13.5 | 32.7 | 45.6 | 16.3 | 9.6 | 28.6 |
| 2019 | 9.2 | 59.3 | 18.5 | 8.8 | 13.3 | 36.4 | 44.3 | 16.7 | 9.6 | 29.3 |

Note: 1. # of lines represents the average number of 2-digit industries of tier 1 subsidiary in each business group. We also report the percentage of registered capital in the top 3 industry in tier 1.
2. # of lines[1] represents the average number of 2-digit industries of each business group. We also report the percentage of registered capital in the top 3 industry in the group.

Two sectors that have garnered considerable attention in the context of these business groups are finance and real estate, both of which are highly regulated. A key motivation for entry into these sectors is the prospect of higher than normal rates of return. In Table 16, we report the total number of subsidiaries in central SASAC groups in these lines of business. Between 2003 and 2019, we observe significantly more rapid growth in both sectors than we do for the groups overall: the number in finance increased from 133 to 831, and in real estate from 1,041 to 3,601. Combined, they represented ten percent of the total number of subsidiaries in 2019. In the case of financial subsidiaries, slightly less than half were either in capital investment services or non-banking investment services.[27] Moreover, much of this growth occurs in lower-tiered subsidiaries that are out of the im-

[27] In the Appendix, Table A3 provides a breakdown of financial subsidiaries by 3-digit industries.

mediate purview of headquarters and SASAC. Note also the absolute reduction in the number of tier 1 subsidiaries in real estate since 2003 from 116 to 55. In 2010, SASAC reportedly allowed only 16 SOEs to remain in the real estate business and required 78 other SOEs whose core business was not related to real estate to exit the real estate industry.[28] Although the number of tier-1 real estate companies decreased immediately in 2011, new real estate companies continued to emerge at lower levels as housing prices rose.

Table 16. Subsidiaries in Finance and Real Estate Sector

| Year | Finance | | | | | Real estate | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total | Tier1 | Tier2 | Tier3 | Tier4+ | Total | Tier1 | Tier2 | Tier3 | Tier4+ |
| 2003 | 133 | 40 | 46 | 33 | 14 | 1,041 | 116 | 394 | 354 | 177 |
| 2007 | 192 | 49 | 58 | 47 | 38 | 1,462 | 104 | 427 | 512 | 419 |
| 2011 | 305 | 59 | 93 | 94 | 59 | 2,040 | 72 | 436 | 746 | 786 |
| 2015 | 500 | 73 | 137 | 158 | 132 | 2,770 | 67 | 516 | 794 | 1,393 |
| 2019 | 831 | 82 | 218 | 266 | 265 | 3,601 | 55 | 494 | 1,027 | 2,025 |

Note: Finance and real estate are one-digit sectors.

### 6.7.2 Vertical Integration

We follow the method proposed by Fan and Lang (2000) and Altomonte and Rungi (2013) to construct a measure of vertical integration at the subsidiary and group level for each business group in our analysis. Below we lay out key steps.

- Identifying the main line business: Business groups are involved in multiple lines of business. The main lines of business are operated through their tier-1 subsidiaries, which are supervised by SASAC. As shown in Table 15, nearly 90 percent of paid-in capital in tier-1 subsidiaries is in the top 3 lines of business. We use these 3 sectors as the headquarters' main lines of business, denoted as $i_1, i_2, i_3$.

- Measuring inter-industry vertical relatedness: As proposed by Fan and Lang (2000), we use the Chinese 2007 input-output table to measure $v_{ij}$ as the yuan value of industry $i's$ output required to produce 1 yuan worth of industry $j's$ output. Conversely, $v_{ji}$ is the yuan value of industry $j's$ output required to produce 1 yuan worth of industry $i's$ output. Fan and Lang (2000) use the simple average of $v_{ij}, v_{ji}$ to measure vertical integration between industry $i, j$. Fan et al. (2017) modified the inter-industry vertical relatedness as $V_{ij} = max(v_{ij}, v_{ji})$, because either a high $v_{ij}$ or a

[28] See http://www.scio.gov.cn/xwfbh/xwbfbh/wqfbh/2011/0222/xgxwfbh/Document/863286/863286.htm

high $v_{ji}$, or both, suggests opportunities to integrate activities in i and j in the same business group. In our paper, we follow Fan et al. (2017)'s method.

- Vertical integration at the subsidiary level: Given subsidiary's industry $j$ and headquarter's industries $i_1, i_2, i_3$, we calculate the subsidiary-level vertical integration as $\frac{1}{S_{i_1}} V_{i_1,j} + \frac{1}{S_{i_2}} V_{i_2,j} + \frac{1}{S_{i_3}} V_{i_3,j}$, where $S_{i_1}$ is share of paid-in capital of industry $i_1$ in tier 1.
- Vertical integration at the business group level: For each of the 3 main lines of business, we calculate their vertical integration with all the subsidiaries of the business group. For example, for $i_1$, $V_{i_1} = \sum_j S_j \times V_{i_1,j}$, where j is subsidiary $j's$ industry and $S_j$ is the share of subsidiary $j$'s registered capital. We then take the weighted average of the vertical integration index of each main line of business to obtain the business group level index, as $V = \frac{1}{S_{i_1}} V_{i_1} + \frac{1}{S_{i_2}} V_{i_2} + \frac{1}{S_{i_3}} V_{i_3}$

Table 17. Vertical Integration Index at the Group and Subsidiary Level

| Year | 2003 | 2007 | 2011 | 2015 | 2019 |
|---|---|---|---|---|---|
| Group | 0.108 | 0.099 | 0.095 | 0.089 | 0.078 |
| Subsidiary | | | | | |
| Tier 1 | 0.121 | 0.115 | 0.114 | 0.116 | 0.114 |
| Tier 2 | 0.081 | 0.083 | 0.088 | 0.083 | 0.071 |
| Tier 3 | 0.082 | 0.062 | 0.049 | 0.052 | 0.050 |
| Tier 4+ | 0.052 | 0.047 | 0.043 | 0.027 | 0.032 |

Note: Vertical integration at the group level is the weighted average of the vertical integration index of the top-3 industry using as weights each industry's share of capital in the top-3 industries. Vertical integration at the subsidiary level is the weighted average of the vertical integration index of the top-3 industry in each tier, weighted by each industry's share of capital in the top-3 industries in that tier.

Table 17 reports our measure of vertical integration at the group and tier level for select years between 2003 and 2019. At the group level, we observe a marked decline from 0.108 in 2003 to 0.078 in 2019: business groups are becoming less vertically integrated over time. This reflects two related forces at work: first, a weakening over time in ties between subsidiaries at every level and the group's main lines of business. For example, vertical integration between tier 3 subsidiary and a group's main line of business declines from 0.082 in 2003 to 0.050 in 2019. And second, the rapidly expanding role of lower-tier subsidiary in these groups, which are less tightly linked with the group's main lines of

business. For example, our measure of vertical integration of tier-3 subsidiary in 2019 in less than half of that of tier-1 subsidiary.

Table 18. Vertical Integration of Groups, by Industry and Year

| Industry | 2003 | 2007 | 2011 | 2015 | 2019 |
|---|---|---|---|---|---|
| Agriculture | 0.018 | 0.017 | 0.015 | 0.015 | 0.016 |
| Mining | 0.051 | 0.084 | 0.091 | 0.094 | 0.087 |
| Manufacturing | 0.070 | 0.070 | 0.091 | 0.076 | 0.061 |
| Utilities | 0.260 | 0.225 | 0.198 | 0.202 | 0.199 |
| Construction | 0.034 | 0.012 | 0.014 | 0.012 | 0.010 |
| Wholesale and Retail | 0.031 | 0.028 | 0.023 | 0.022 | 0.020 |
| Transportation | 0.042 | 0.046 | 0.035 | 0.036 | 0.033 |
| IT | 0.015 | 0.017 | 0.023 | 0.023 | 0.022 |
| Leasing and Business Service | 0.036 | 0.059 | 0.082 | 0.073 | 0.048 |
| Technical Service | 0.124 | 0.111 | 0.109 | 0.089 | 0.075 |
| R&D | 0.060 | 0.041 | 0.081 | 0.047 | 0.031 |

Note: We take a weighted average of the business group-level VI index, weighted by each group's total capital

Table 18 reports vertical integration by a group's main line of business. We observe significant differences in the cross-section, with groups in utilities most highly integrated. We also find important differences by industry over time, with mining, manufacturing, and leasing and business services experiencing a rise through 2011, followed by a decline. Utilities and technical services, which combined represent more than a third of group capital under SASAC, became significantly less vertically-integrated over time.

## 7 Financial Performance of Groups under Central SASAC: 2008-2012

Most of the analysis of the financial performance of SOE groups is at a highly aggregate level, focusing on either all of the groups under central SASAC or the small number of listed companies within the group. The reason for this is straightforward – the lack of data at the subsidiary level. In this section we leverage data at the subsidiary level for the period between 2008-2012 to provide a more disaggregated perspective. We do this in several steps, first aggregating the subsidiary-level data to the group level, thereby allowing comparison with other estimates reported by SASAC. Next, we report summary data by type of subsidiary, i.e., non-listed, listed, and subsidiary of listed firms, and then by tier within a group calculated over all firms at that level. Finally, we examine key relationships in a regression context that allows us to link financial indicators with features

of a subsidiary highlighted in our earlier analysis: tier in the hierarchy; listed company or subsidiary of a listed company within the group versus non-listed; minority investors; and links with the main lines of business of the group. It is important to remember that each of these variables at the subsidiary is in principle endogenous, and our estimates are sensitive to possible omitted variables and simultaneity bias. In this regard, the results are better interpreted as descriptive rather than causal.

### 7.1 Aggregate Picture

Drawing on the subsidiary-level data, in Panel A of Table 19 we report aggregate totals for key financial variables for all subsidiaries in groups under SASAC and in Panel B compute several measures of financial performance.[29] Our estimates of these key variables line up well with aggregate totals reported by Central SASAC.[30] Over a five-year window that spans the Global Financial Crises, we observe rapid expansion in these groups, with most variables doubling in size. Assets, for example, increased from 17.3 trillion yuan in 2008 to 32.2 trillion in 2012, or at an annual rate of 16.8% per annum. With liabilities growing slightly more rapidly than assets, the ratio of liabilities to assets increased from 57.0% to 61.2%. Leverage also increased. Accompanying the increase in leverage is a modest increase in ROA and ROE through 2011, followed by a decline in both in 2012.

In Table 20, we break down these estimates by type of subsidiaries, distinguishing between non-listed subsidiary, listed firms, and subsidiary of listed firms. In terms of assets, non-listed firms are initially most important, representing 62% of group assets in 2008, however, their share falls to 51% by 2012 as listed firms and their subsidiary grow much more rapidly. As for profitability, there is a clear hierarchy: listed firms enjoy the highest ROA, followed by their subsidiary and then non-listed subsidiary. Subsidiaries of listed firms are the most leveraged, and became even more leveraged over time. By contrast, leverage in non-listed subsidiaries remained largely unchanged. Leverage in listed firms is lowest and increased modestly from 1.8 to 2.0. There is a similar ranking across the three types of subsidiary for the liability-asset ratio.

[29] We have incomplete financial information for a small percentage of subsidiary for some of these variables. We impute values based on a chained PMM imputation method using the information on a subsidiary's age, industry, and registered capital information, separately for each cell defined in terms of tier and type of firm (non-listed, listed, and listed firms' subsidiary).

[30] In Appendix Table A4, we report estimates for 2005-2017 taken from Lardy (2019). Small differences may be attributed to differences in the definition of control, and thus the number of subsidiaries over which these calculations are made, as well as differences in reporting. For the five years that the data overlap, assets from the two sources line up reasonably well, with our estimates of profits slightly lower. This leads to a lower ROA in each year of approximately one percent, but the trend is similar. The two sets of estimates also suggest very similar behavior for the liability-asset ratio.

Table 19. Financial Performance, by Year

Panel A: Financial Variable in Billion Yuan

| Year | Asset | Liability | Equity | Revenue | Profit | Net Profit | Tax |
|---|---|---|---|---|---|---|---|
| 2008 | 17,290.4 | 9,860.5 | 7,394.0 | 13,837.4 | 531.4 | 446.3 | 546.0 |
| 2009 | 22,153.1 | 12,970.7 | 9,110.9 | 15,288.1 | 701.8 | 578.9 | 672.8 |
| 2010 | 26,107.5 | 15,527.3 | 10,506.3 | 21,339.6 | 949.2 | 778.1 | 869.5 |
| 2011 | 28,714.6 | 17,218.7 | 11,401.5 | 23,490.8 | 1,033.7 | 834.7 | 933.2 |
| 2012 | 32,214.5 | 19,710.1 | 12,437.8 | 26,334.0 | 955.0 | 787.8 | 908.4 |

Panel B: Financial Performance

| Year | ROA(%) | ROE(%) | Liability/Asset(%) | Leverage |
|---|---|---|---|---|
| 2008 | 3.1 | 7.2 | 57.0 | 2.3 |
| 2009 | 3.2 | 7.7 | 58.6 | 2.4 |
| 2010 | 3.6 | 9.0 | 59.5 | 2.5 |
| 2011 | 3.6 | 9.1 | 60.0 | 2.5 |
| 2012 | 3.0 | 7.7 | 61.2 | 2.6 |

Note: Calculated from the Annual Report Data from the Business Registry in 2008-2012 and Wind Data for listed companies. For listed companies, we use the financial data of headquarters rather than the combined balanced sheet. ROA is total profits over total assets. ROE is total profits over total equity. Leverage is measured as total assets over total equity. For firms with missing information, we impute these variables in a chained algorithm based on a firm's industry, registered capital, and age, separately by a firm's tier, and role as a headquarters, a non-listed subsidiary or a listed subsidiary.

We report related information by tiers in Table 21. Tier-1 subsidiaries dominate in terms of assets, but their share fell significantly from 58% (9,998.3/(9998.3 + 4973.0 + 2355.1)) in 2008 to 46% in 2012, mirroring the fact that lower tiers became important over time. Lower-tier subsidiary also perform significantly better, with a clear ranking in terms of ROA as we move down the hierarchy. In 2008, for example, subsidiaries in tier 3 and below earned a 3.9% return on assets compared with 2.8% for firms in the first tier. Lower-tier firms are also more highly leveraged, both in terms of their liability-asset ratio and asset-equity ratio.

### 7.2 Group Structure and Financial Performance: Subsidiary Level

Analysis of aggregate totals can be highly misleading, and miss important heterogeneity and influence of a small set of firms. For example, three listed companies associated with China Petro, Sinopec and Shenhua were the source of three-quarters of the total profits of

Table 20. Financial Variable, by Type

| Year | Type | Asset | Profit | ROA | Liability /Asset Ratio | Leverage |
|---|---|---|---|---|---|---|
| 2008 | Non-listed | 10,814.1 | 184.3 | 1.7 | 59.5 | 2.5 |
| 2008 | Listed | 3,716.8 | 210.1 | 5.7 | 43.4 | 1.8 |
| 2008 | Listed, sub | 2,759.6 | 137.0 | 5.0 | 65.6 | 2.9 |
| 2009 | Non-listed | 13,193.6 | 234.8 | 1.8 | 60.2 | 2.5 |
| 2009 | Listed | 4,686.3 | 299.2 | 6.4 | 44.4 | 1.8 |
| 2009 | Listed, sub | 4,273.3 | 167.8 | 3.9 | 69.0 | 3.2 |
| 2010 | Non-listed | 14,825.8 | 294.2 | 2.0 | 61.1 | 2.6 |
| 2010 | Listed | 5,440.3 | 382.4 | 7.0 | 45.5 | 1.8 |
| 2010 | Listed, sub | 5,841.5 | 272.5 | 4.7 | 68.2 | 3.2 |
| 2011 | Non-listed | 15,800.6 | 364.2 | 2.3 | 60.9 | 2.6 |
| 2011 | Listed | 6,045.1 | 342.9 | 5.7 | 48.2 | 1.9 |
| 2011 | Listed, sub | 6,869.0 | 326.7 | 4.8 | 68.3 | 3.2 |
| 2012 | Non-listed | 16,568.1 | 333.2 | 2.0 | 61.2 | 2.6 |
| 2012 | Listed | 6,693.8 | 275.5 | 4.1 | 50.1 | 2.0 |
| 2012 | Listed, sub | 8,952.7 | 346.2 | 3.9 | 69.5 | 3.3 |

Note: See Table 19.

listed companies reported in Table 20. We revisit the relationship between key financial outcomes and subsidiary type in a regression context that allows us to control for other dimensions of these subsidiary. Altogether, we have nearly 150,000 annual observations on more than 30,000 subsidiary for the period between 2008-2012. We do the same at the group level, for which we have 606 annual observations. In Table A5, we report the summary statistics of key variables at both the subsidiary and group level.

Table 22 reports OLS results for assets (log) at the subsidiary level. In columns (1)-(4), we report the effect of each variable separately, and in column 5 report the estimates from a regression that includes all of the variables. All regressions include province and year fixed effects. In columns (6)-(10), we also include business group fixed effects to control for any time-invariant group factors that differ across these business groups. These estimates are very similar to those reported in columns (1) - (5). Several interesting correlations emerge. First, resources, measured in terms of assets, flow to higher-tier subsidiaries that are most closely linked economically with the group's main line of business. Assets in tier 1 subsidiary are 61% larger than those in tier 2. Subsidiaries that are more vertically integrated with the group's main line of business are also larger, with a one standard deviation change in our measure of vertical integration resulting in an increase in assets

Table 21. Financial Variable, by Tier

| Year | Tier | Asset | Profit | ROA | Liability /Asset Ratio | Leverage |
|---|---|---|---|---|---|---|
| 2008 | 1 | 9,998.3 | 282.5 | 2.8 | 51.9 | 2.1 |
| 2008 | 2 | 4,937.0 | 157.2 | 3.2 | 63.2 | 2.7 |
| 2008 | 3+ | 2,355.1 | 91.7 | 3.9 | 66.1 | 3.0 |
| 2009 | 1 | 12,761.5 | 363.9 | 2.9 | 53.3 | 2.1 |
| 2009 | 2 | 6,291.9 | 221.9 | 3.5 | 64.2 | 2.9 |
| 2009 | 3+ | 3,099.8 | 116.0 | 3.7 | 68.7 | 3.2 |
| 2010 | 1 | 13,471.3 | 469.6 | 3.5 | 54.4 | 2.2 |
| 2010 | 2 | 8,197.6 | 304.9 | 3.7 | 63.5 | 2.8 |
| 2010 | 3+ | 4,438.6 | 174.7 | 3.9 | 67.3 | 3.1 |
| 2011 | 1 | 13,894.4 | 465.0 | 3.3 | 54.2 | 2.2 |
| 2011 | 2 | 9,320.8 | 346.0 | 3.7 | 63.5 | 2.8 |
| 2011 | 3+ | 5,499.4 | 222.7 | 4.0 | 68.5 | 3.2 |
| 2012 | 1 | 14,774.7 | 402.1 | 2.7 | 55.2 | 2.2 |
| 2012 | 2 | 10,751.1 | 341.8 | 3.2 | 65.1 | 2.9 |
| 2012 | 3+ | 6,688.7 | 211.1 | 3.2 | 68.0 | 3.2 |

Note: See Table 19.

of 32.3 percent (4.051 * 0.080). At the same time, listed companies and their subsidiary are also larger. Controlling for their level in the hierarchy, listed firms are three and a half times larger than non-listed firms, and their subsidiary almost fifty percent larger in size. The coefficient on the dummy for an minority investor is 0.191, indicating assets that are on average 19% higher with outsider investors.

On the other hand, regressions for the return on assets (ROA) reported in Table 23 suggest that with one exception, these same attributes are associated with lower returns on assets. Higher tier subsidiary nearer to HQs as well as those that are more tightly linked economically with the group's main lines of business experienced lower returns on their assets. Tier 2 subsidiaries, for example, enjoy higher returns of 0.007 percentage points compared to tier 1, a 9.3 percent (=0.007/0.075) difference. The difference between tier 1 and tier 4 subsidiary is four times this. At the same time, a one standard deviation increase in VI results in a reduction in returns of 0.009, or a 12 percent change. Returns in listed companies were also significantly lower than non-listed firms by 0.029 percentage points, but this was partially offset by 0.024 percentage point higher returns in subsidiary under their control.[31] Having minority investors has a significant benefit on asset returns,

[31]In contrast to the earlier results reported in Table 26, ROA is lower for listed firms compared to non-

Table 22. Asset and Subsidiary's Attributes

| Dep. Var. | (1) | (2) | (3) Ln(asset) | (4) | (5) | (6) | (7) | (8) Ln(asset) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| Tier2 | -1.68** | | | | -1.82** | -1.87** | | | | -1.93** |
| Tier3 | -2.29** | | | | -2.53** | -2.70** | | | | -2.80** |
| Tier4+ | -2.63** | | | | -2.91** | -3.21** | | | | -3.34** |
| Sub VI | | 4.05** | | | 3.91** | | 5.06** | | | 3.60** |
| Minor. inv. | | | 0.19** | | 0.14** | | | 0.22** | | 0.19** |
| Listed | | | | 3.56** | 2.91** | | | | 3.56** | 2.79** |
| Listed, sub | | | | 0.47** | 1.01** | | | | 0.51** | 0.95** |
| Year2009 | 0.19** | 0.16** | 0.16** | 0.13** | 0.13** | 0.17** | 0.15** | 0.15** | 0.12** | 0.12** |
| Year2010 | 0.35** | 0.27** | 0.28** | 0.24** | 0.28** | 0.30** | 0.25** | 0.25** | 0.21** | 0.23** |
| Year2011 | 0.49** | 0.39** | 0.40** | 0.35** | 0.40** | 0.42** | 0.35** | 0.36** | 0.31** | 0.34** |
| Year2012 | 0.63** | 0.53** | 0.53** | 0.47** | 0.51** | 0.55** | 0.46** | 0.47** | 0.41** | 0.44** |
| Constant | 5.85** | 3.65** | 3.73** | 3.67** | 5.48** | 6.14** | 3.51** | 3.62** | 3.57** | 5.70** |
| Group FE | No | No | No | No | No | Yes | Yes | Yes | Yes | Yes |
| Adj. $R^2$ | 0.15 | 0.06 | 0.03 | 0.06 | 0.22 | 0.21 | 0.11 | 0.08 | 0.11 | 0.26 |
| Obs. | 149,514 | 149,514 | 149,514 | 149,514 | 149,514 | 149,514 | 149,514 | 149,514 | 149,514 | 149,514 |

Note: We include province fixed effects and control for age and age square. Standard errors clustered at the group level. ∗∗ at 1% level,∗∗ at 5% level,,+ at 10% level.

shown in column (3). In column (5), all the explanatory variables are included simultaneously and the findings continue to hold.

In the regressions we include year dummies with 2008 as the omitted year. The coefficient for 2009 is positive and statistically significant, indicating an increase in returns over 2008 of 1 percentage point. For later years however, the coefficients are negative and significant at the 99% level, especially for year 2012 with an estimate of -0.02, indicating an average decrease of return of assets at subsidiary level since 2010. In columns (6)-(10), we add business group fixed effects, in which case identification of the effect is coming off of differences between tiers within individual business groups, with the results once again robust to their inclusion.

Recall that minority investors differed by type. We examine the heterogeneous effects of these minority investors on subsidiary financial returns, controlling for the same set of explanatory variables discussed above. Conditional on having minority investors, Table 24 shows that the share of private minority investors has the largest positive impact on return of asset. Column (1) implies that a one standard deviation increase in the private share results in a 0.003 increase in the return on assets, or an increase of 4.0 percent. In

listed subsidiary. The difference reflects the fact that in the regressions we are able to control for other attributes of the subsidiaries that may be correlated with their returns.

Table 23. ROA and Subsidiary's Attributes

| Dep. Var. | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| | Profit/Asset | | | | | | Profit/Asset | | | |
| Tier2 | 0.03** | | | | 0.03** | 0.03** | | | | 0.03** |
| Tier3 | 0.03** | | | | 0.02** | 0.04** | | | | 0.03** |
| Tier4+ | 0.04** | | | | 0.03** | 0.05** | | | | 0.04** |
| Sub VI | | -0.11** | | | -0.10** | | -0.11** | | | -0.10** |
| Minor. inv. | | | 0.01** | | 0.01** | | | 0.01** | | 0.01** |
| Listed | | | | -0.03** | -0.03** | | | | -0.03** | -0.03** |
| Listed, sub | | | | 0.02** | 0.02** | | | | 0.03** | 0.02** |
| Year2009 | 0.01** | 0.01** | 0.01** | 0.01** | 0.01** | 0.01** | 0.01** | 0.01** | 0.01** | 0.01** |
| Year2010 | -0.01** | -0.01** | -0.01** | -0.01** | -0.01** | -0.01** | -0.01** | -0.01** | -0.01** | -0.01** |
| Year2011 | -0.01** | -0.01** | -0.01** | -0.01** | -0.01** | -0.01** | -0.01** | -0.01** | -0.01** | -0.01** |
| Year2012 | -0.02** | -0.02** | -0.02** | -0.02** | -0.02** | -0.02** | -0.02** | -0.02** | -0.02** | -0.02** |
| Constant | 0.05** | 0.09** | 0.08** | 0.08** | 0.05** | 0.05** | 0.09** | 0.08** | 0.08** | 0.05** |
| Group FE | No | No | No | No | No | Yes | Yes | Yes | Yes | Yes |
| Adj. $R^2$ | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.01 | 0.01 | 0.02 | 0.02 |
| Obs. | 149,514 | 149,514 | 149,514 | 149,514 | 149,514 | 149,514 | 149,514 | 149,514 | 149,514 | 149,514 |

Note: We include province fixed effects and control for age and age square. Standard errors clustered at the group level. $**$ at 1% level,$**$ at 5% level,,$+$ at 10% level.

column (2), we include separately the share of the other two types of investors, i.e. SOE investors outside the business group and SOE investors within the group. The coefficient of "SOE outside the group" is not statistically different from zero while that of "SOE within group" is significantly negative and equal to -0.003. In column (3), we simultaneously include the share of all type of investors, and find that the shares of private investors and "SOE outside the group" have positive impacts on the return on asset however the share of SOE minority investors within the group does not affect returns on asset. In columns (4)-(6), we include business group fixed effects and find robust results.

One interpretation of these results is that minority investors from outside the group, especially private investors, help relieve agency problems and increase the profitability. In contrast, minority investors within the group, which is a cross-listing within the group, has no benefit for firm performance. Caution is required here as minority ownership may be endogenous, with "insiders – state as well as non-state – allowed opportunities to invest in more profitable subsidiaries within the group. Profitable subsidiaries in groups may also be tasked with investing in their least profitable counterparts within the group.

Table 24. ROA and Type of Minority Investors

| Dep. Var. | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Profit/Asset | | | Profit/Asset | | |
| Minor. investor | 0.01** | 0.01** | 0.01+ | 0.01** | 0.01** | 0.01+ |
| Share of private minor. inv. | 0.02** | | 0.03** | 0.02** | | 0.03** |
| Share of other SOE minor. inv. | | 0.00 | 0.02* | | 0.00 | 0.02* |
| Share of within-group minor. inv. | | -0.03** | -0.01 | | -0.02* | -0.01 |
| Constant | 0.05** | 0.05** | 0.05** | 0.05** | 0.05** | 0.05** |
| Group FE | No | No | No | Yes | Yes | No |
| Adj. $R^2$ | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.01 |
| Obs. | 149,514 | 149,514 | 149,514 | 149,514 | 149,514 | 149,514 |

Source: We include the same control variables in column (5) of table 22, i.e. level, VI, listed firm dummy, listed firms' subsidiary dummy, age, age square, year dummy variables, and province fixed effects. Standard errors clustered at the group level. ∗∗ at 1% level,∗∗ at 5% level,,+ at 10% level.

### 7.3 Group Structure and Financial Performance: Group Level

Aggregating subsidiaries' financial variables to the group level, we further examine the relationship between financial performance and group-level attributes. As we did at the subsidiary level, we control for province and year fixed effects and regress the log of assets and the return on assets on key attributes (standardized) introduced in the previous section. Results are reported in Table 25 and suggest patterns that line up with those at the subsidiary level.

The total number of listed companies and pyramid length are positively associated with total assets, but are not related with the aggregate return on assets. In groups that are more vertically integrated, total assets are also larger, implying more abundant resources. However, more vertically integrated groups experience lower group-level returns on asset, with a one standard deviation increase of business group vertical integration associated with a reduction in the ROA by 0.004, or a 12.5 percent decline. Controlling for group and year and location fixed effects, which compares returns within business groups over time, the reduction is double at 0.009, or a 28.7% decline.

Table 25. Financial Performance and Group's Attributes

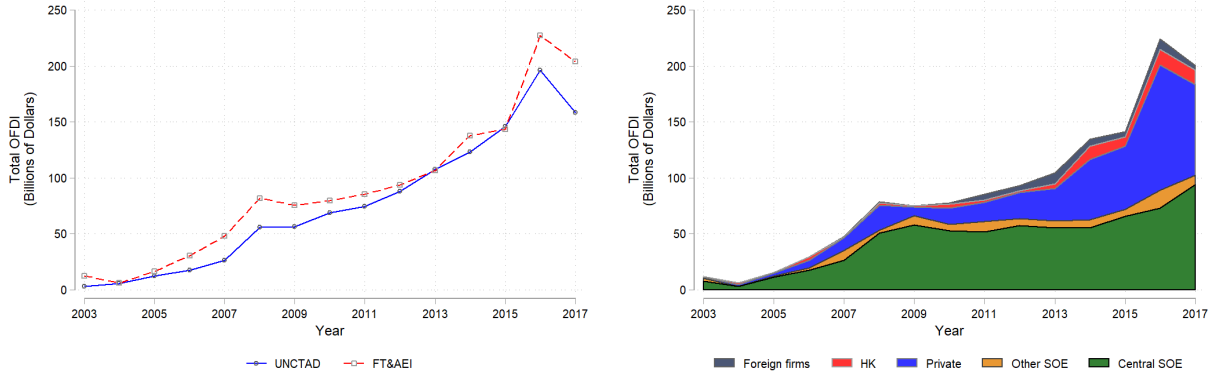
| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Group level variable: | Ln (asset) | | Profit/ Asset | |
| Vertical integration | 4.50* | 3.45+ | -0.07** | -0.15* |
| Tier length | 0.89** | 0.36 | -0.00 | 0.00 |
| # of listed firms | 0.09+ | 0.06 | 0.00 | 0.00 |
| Constant | 5.96** | 9.89** | 0.04** | 0.00 |
| Group FE | No | Yes | No | Yes |
| Adj. $R^2$ | 0.61 | 0.90 | 0.01 | 0.22 |
| Obs. | 604 | 592 | 604 | 592 |

Source: We include province fixed effects and control for age and age square. Standard errors clustered at the group level. $**$ at 1% level,$**$ at 5% level,,$+$ at 10% level.

These findings are suggestive of possible contradictions and tensions within these groups between their priorities. From the perspective of the state, a major priority is development of critical capabilities in group's core line(s) of business, usually strategic and emerging industry. Resources flow in this direction, but returns suffer. Lower returns may reflect the inherent difficulty and high costs of developing capabilities in technologically-demanding lines of business. We can also not rule out that the state's commitment to capabilities in these national champions is itself a source of soft budget constraints that insiders are able to exploit to extract rents. There is an obvious parallel here to a commitment to jobs in the state sector in the 1980s and 1990s, which was an important source of soft budget constraints during this period.

## 8 Chinese Overseas Investment and the Overall Growth of Central SOEs

Our analysis has focused on the organization of state owned enterprise groups as seen from the perspectives of changes in their domestic activity. Over the last decade, outward forward direct investment (OFDI) by Chinese firms has increased significantly as part of China's "Going Out" strategy. A more complete picture of the evolution of the SOEs requires we integrate their global expansion into our earlier analysis.




(a) By Resource (b) By Ownership

Figure 3. Total OFDI of Chinese Firms

Source: UNCTAD data and Authors' calculations using the combination of Business Registry Data, the AEI Data, and the fDiMarkets Data.

### 8.1 Overseas Investment

Drawing on data compiled by UNCTAD, Figure 3a shows the behavior of Chinese OFDI between 2003 and 2017. Chinese OFDI increased from only $US 2.9 billion in 2003 to $US 158.3 billion in 2017, and totaled $US 660.5 billion (4,320 billion RMB) in 2017. UNCTAD's estimates are based on balance of payments (BOP) FDI data, aggregated to the country level. They capture funds provided by parent companies in the form of equity capital, inter-company debt, and reinvested earnings, but exclude any external funds raised in host countries (Desbordes and Wei, 2017).[32]

A number of new data collection efforts catalogue Chinese OFDI by individual projects, and allow for a more detailed breakdown of investment by sector and ownership type of Chinese firms.[33] Estimates for aggregate OFDI based on the combined databases are in line with those from UNCTAD, but slightly higher mainly because of their fuller coverage and the inclusion of external funds raised in host countries.[34] Figure 3b provides a breakdown of total Chinese OFDI of incorporated firms between 2003 and 2017 by firm

[32]The identification of FDI size is also complicated by the BOP definition for mining, real estate, and mobile equipment industry, introduced in UNCTAD (2009).

[33]In our analysis, we combine the China Global Investment Tracker by the American Enterprise Institute (AEI) and fDiMarkets Data by the Financial Times. The AEI data covers all the direct and indirect investment valued more than 100 million USD, including greenfield FDI and M&A. The fDiMarkets Data includes greenfield FDI only but covers investments below 100 million USD. Details regarding these two sets of data are discussed in Desbordes and Wei (2017) and Luo et al. (2017).

[34]Although the CGIT data tries to identify indirect investment of Chinese firm, i.e. the case in which a subsidiary of Chinese firms in Hong Kong makes an investment in other countries with capital provided by headquarters in mainland China, we missed cases involving below-scale greenfield investment.

ownership.[35] Over much of this period, investment by central SOEs dominates, and represents more than half of total Chinese OFDI, or nearly $US 60 billion annually.

Table 26. ODI Number and Value, by Year

| Year | SASAC | | MOF | | SC | | Total | |
|---|---|---|---|---|---|---|---|---|
| | Value | Number | Value | Number | Value | Number | Value | Number |
| 2003 | 59.3 | 21 | 2.6 | 10 | – | – | 61.8 | 31 |
| 2004 | 22.9 | 15 | 2.0 | 2 | – | – | 24.9 | 17 |
| 2005 | 92.9 | 25 | 0.5 | 2 | – | – | 93.4 | 27 |
| 2006 | 111.2 | 22 | 28.5 | 8 | 0.2 | 1 | 139.9 | 31 |
| 2007 | 91.2 | 41 | 107.3 | 20 | – | – | 198.4 | 61 |
| 2008 | 309.4 | 71 | 41.8 | 15 | 0.3 | 1 | 351.6 | 87 |
| 2009 | 304.3 | 73 | 88.4 | 42 | 0.4 | 1 | 393.1 | 116 |
| 2010 | 291.1 | 69 | 46.0 | 37 | 12.5 | 5 | 349.5 | 111 |
| 2011 | 272.6 | 89 | 60.3 | 50 | 9.9 | 1 | 342.9 | 140 |
| 2012 | 313.8 | 70 | 44.4 | 52 | – | – | 358.2 | 122 |
| 2013 | 299.2 | 92 | 34.7 | 27 | 0.0 | 1 | 334.0 | 120 |
| 2014 | 280.0 | 74 | 42.6 | 46 | 12.9 | 3 | 335.4 | 123 |
| 2015 | 322.2 | 116 | 103.9 | 58 | 0.7 | 1 | 426.8 | 175 |
| 2016 | 392.3 | 113 | 107.7 | 49 | 2.3 | 5 | 502.3 | 167 |
| 2017 | 497.1 | 94 | 126.0 | 28 | 0.1 | 1 | 623.2 | 123 |
| Total | 3,659.4 | 985 | 836.8 | 446 | 39.4 | 20 | 4,535.5 | 1,451 |

Note: ODI by each Business Group is from the Financial Times and AEI data. Investment is reported in billion yuan.

Table 26 reports the total number of projects and total OFDI by year for enterprise groups under SASAC, the Ministry of Finance, and the State Council. These investments are sizable, and average several billion RMB per project. OFDI by groups under central SASAC consistently represents 80 percent of total OFDI by central SOE groups. Table 27 provides a breakdown of these investments by sector.[36] Upstream investments in energy and natural resources dominate, with smaller investments in transportation, real estate, and technology. Moreover, slightly less than half of these investments are by four enterprise groups.[37]

[35]We link Chinese investors' in the OFDI database to the Business Registry Data. We are able to match 89% of the deals, which cover 96% of total investment.

[36]In the OFDI database, sector is defined in terms of the type of final goods. This breakdown may not line up exactly with our breakdown of the groups by major sector, which is defined by Business Registry

Table 27. ODI Number and Value, by Sector

| Sector | Central | | Finance | | SC | |
|---|---|---|---|---|---|---|
| | Value | Number | Value | Number | Value | Number |
| Agriculture | 345.4 | 33 | 16.5 | 5 | 0.7 | 3 |
| Chemicals | 52.4 | 47 | 1.3 | 4 | – | – |
| Energy | 2,238.1 | 331 | 129.3 | 25 | – | – |
| Finance | 1.1 | 9 | 259.1 | 300 | – | – |
| Metals & Minerals | 392.0 | 137 | 42.2 | 13 | 10.8 | 4 |
| Other Manufacturing | 50.2 | 32 | 9.0 | 16 | – | – |
| Real Estate | 108.9 | 39 | 14.6 | 6 | – | – |
| Real estate | 68.1 | 31 | 157.2 | 35 | 18.5 | 2 |
| Services | 20.8 | 49 | 138.4 | 13 | 0.1 | 3 |
| Technology | 50.1 | 72 | 33.7 | 14 | 8.0 | 4 |
| Transport | 332.2 | 205 | 35.3 | 15 | 1.3 | 4 |

Note: ODI by each business group is from the Financial Times and AEI data. Investment is reported in billion yuan.

### 8.2 Change in Overall Market Capitalization and the Growth of the State Sector

China's state-owned enterprises expanded both domestically and internationally. How important is the outward expansion relative to new investments made domestically? We have information on the total registered capital of domestic subsidiaries of the SOEs (see Table 6 for SOE under SASAC), and their OFDI. These two measures are not directly comparable however. The latter is the price paid by Chinese firms for foreign assets, which in principle reflects the expected aggregate return to the assets. The registered capital of a domestic company, on the other hand, represents the total equity of investors.

In principle, stock prices should reflect the expected future returns of the company (Fama, 1970).[38] Using information on "listed" Central SOEs, we compute estimates of the price-equity ratio for their shares at the one-digit sector level.[39] Multiplying the registered capital in domestic SOEs by the P/E ratio, we obtain the market value of the equity of central SOEs in their domestic subsidiary. Year-to-year changes in this value are directly

mainly in terms of the production process.

[37]The four leading groups are China Petro, Sinopec, China National Offshore Oil, and the Blue Star Group.

[38]The extent to which this is true for China is open for debate. Carpenter et al. (2021) argues that the "Chinese stock market .... has become as informative about future corporate profits as in the US."

[39]The price-equity ratio is measured as the average ratio of the market price over the book value of each share for central listed SOEs within each industry-year. The P/E ratio tends to be cyclical.

Table 28. Total Investments of Groups under the Central SASAC

| Year | Total Investment | Share of Total Investment(%) | | | |
|---|---|---|---|---|---|
| | | ODI | Incumbent | New | Domestic Acquisition |
| 2004 | 0.76 | 3.0 | 9.1 | 63.3 | 24.6 |
| 2005 | 0.70 | 13.3 | 15.3 | 47.3 | 24.1 |
| 2006 | 1.37 | 8.1 | 18.7 | 34.3 | 38.8 |
| 2007 | 3.82 | 2.4 | 16.8 | 45.0 | 35.9 |
| 2008 | 1.99 | 15.5 | 19.7 | 32.8 | 31.9 |
| 2009 | 3.09 | 9.8 | 25.5 | 36.9 | 27.7 |
| 2010 | 3.04 | 9.6 | 37.8 | 28.4 | 24.3 |
| 2011 | 2.47 | 11.0 | 38.2 | 33.4 | 17.4 |
| 2012 | 2.19 | 14.3 | 36.2 | 37.4 | 12.1 |
| 2013 | 2.70 | 11.1 | 47.9 | 28.1 | 12.8 |
| 2014 | 2.94 | 9.5 | 36.2 | 36.0 | 18.2 |
| 2015 | 4.80 | 6.7 | 42.0 | 25.7 | 25.6 |
| 2016 | 5.82 | 6.7 | 43.6 | 29.1 | 20.6 |
| 2017 | 7.94 | 6.3 | 58.2 | 20.1 | 15.4 |

Note: Total Investment is reported in trillion Yuan. The increase in investment in incumbents, in new firms, and in acquisitions is measured by the registered capital associated with these investments multiplied by the price-equity ratio of SOE firms from the stock market in the same industry-year. The share of total investment of each type of investment is reported.

comparable to our estimates of OFDI.

Table 28 shows the change in the market capitalization of state-owned enterprise groups under SASAC between 2004-2017, and the contribution coming from each source: changes in incumbent firms, the establishment of new domestic subsidiaries, domestic acquisitions, as well as through OFDI. Related information for SOEs under MOF and SC is provided in Appendix Table A6 and A7. Over this period, the market capitalization of enterprise groups under Central SASAC increased in total by 43.3 trillion RMB, and in 2017 by nearly 7.9 trillion RMB. In general, most of this was through domestic expansion of the central SOEs, with one-eighth tied to overseas acquisitions by these groups. Domestically, the largest source of the increase was through the establishment of new subsidiaries by the SOEs, followed by increases amongst incumbents, and then through domestic acquisitions. Recall that over this period, the number of subsidiary of SOE groups under SASAC increased from 22,338 to 43,999. Note also the declining role of OFDI to expansion of these groups after 2012.

# 9 Conclusion

We document the evolving structure of enterprise groups under central government control since the establishment of SASAC in 2003. Changes were the product of consolidation by the central government as well as efforts inside and outside of these groups to influence group structure. Especially important was the rapidly expanding role of new listed firms, an important source of external finance, and the new subsidiaries under their control.

Between 2003-2019, registered capital and investment in these groups grew at an annual rate of more than 10 percent, much of it through the addition of new listed companies and lower tiered subsidiaries. In principle, this could have helped to raise group returns: lower-tiered subsidiaries are better insulated from government influence at the top, benefit from more outside non-state ownership, and are less vertically integrated with the group's main line of business. Consolidation across enterprise groups could have also supported higher returns by eliminating excess capacity and duplicate investment.

However, the rate of return on assets in these groups fell further to only 2.9 percent in 2019, a product of countervailing influences on group outcomes. Contradictory priorities, a misalignment of interests, and vertical as well as horizontal agency issues are especially salient here. For the state as well as top-level managers in the groups, whose interests were often aligned, the development of strategic capabilities through national champions, self-sufficiency, and jobs dominated concerns over efficiency and returns. Insiders were also able to leverage soft-budget constraints tied to the state's commitment to these same priorities to extract rents that further dissipated group returns.

Over this same period, enterprise groups under provincial government control and private enterprise groups have also grown rapidly and undergone significant changes in structure. A comparative analysis of central, provincial and private sector groups can help reveal the disparate forces shaping group structure and returns, and the larger links between them.

## References


ACEMOGLU, D., S. JOHNSON, AND T. MITTON (2009): "Determinants of Vertical Integration: Financial Development and Contracting Costs," *The Journal of Finance*, 64, 1251–1290.

ALMEIDA, H., AND D. WOLFENZON (2006): "Should business groups be dismantled? The equilibrium costs of efficient internal capital markets," *Journal of Financial Economics*, 79, 99–144.

ALTOMONTE, C., AND A. RUNGI (2013): "Business Groups as Hierarchies of Firms: Determinants of Vertical Integration and Performance," SSRN Scholarly Paper ID 2269638, Social Science Research Network, Rochester, NY, https://papers.ssrn.com/abstract=2269638.

ATALAY, E., A. HORTAÇSU, AND C. SYVERSON (2014): "Vertical Integration and Input Flows," *American Economic Review*, 104, 1120–48.

BAI, C.-E., C.-T. HSIEH, AND Z. SONG (2020): "Special Deals With Chinese Characteristics," *NBER macroeconomics annual*, 34, 341–379.

BECK, K. I., AND K. E. BRØDSGAARD (2022): "Corporate Governance With Chinese Characteristics: Party Organization in State-Owned Enterprises," *The China Quarterly*, 250, 486–508.

BENA, J., AND H. ORTIZ-MOLINA (2013): "Pyramidal Ownership and the Creation of New Firms," *Journal of Financial Economics*, 108, 798–821.

BORUSYAK, K., X. JARAVEL, AND J. SPIESS (2024): "Revisiting Event Study Designs: Robust and Efficient Estimation," *Review of Economic Studies*, rdae007.

CARPENTER, J. N., F. LU, AND R. F. WHITELAW (2021): "The Real Value of China's Stock Market," *Journal of Financial Economics*, 139, 679–696.

CLAESSENS, S., S. DJANKOV, AND L. H. LANG (2000): "The Separation of Ownership and Control in East Asian Corporations," *Journal of financial Economics*, 58, 81–112.

DESBORDES, R., AND S.-J. WEI (2017): "The Effects of Financial Development on Foreign Direct Investment," *Journal of Development Economics*, 127, 153–168.

FAMA, E. F. (1970): "Efficient Capital Markets: A Review of Theory and Empirical Work," *The Journal of Finance*, 25, 383–417.

FAN, J. P. H., T. J. WONG, AND T. ZHANG (2013): "Institutions and Organizational Structure: The Case of State-Owned Corporate Pyramids," *Journal of Law, Economics, and Organization*, 29, 1217–1252.

FAN, J. P. H., AND L. H. P. LANG (2000): "The Measurement of Relatedness: An Application to Corporate Diversification," *The Journal of Business*, 73, 629–660.

FAN, J. P., J. HUANG, R. MORCK, AND B. YEUNG (2017): "Institutional Determinants of Vertical Integration in China," *Journal of Corporate Finance*, 44, 524–539.

HE, J., X. MAO, O. M. RUI, AND X. ZHA (2013): "Business Groups in China," *Journal of Corporate Finance*, 22, 166–192.

HUANG, T., N. VÉRON, AND D. XU (2022): "The Private Sector Advances in China: The Evolving Ownership Structures of the Largest Companies in the XI Jinping Era," Peterson Institute for International Economics Working Paper 22-3.

HUANG, Z., L. LI, G. MA, AND L. C. XU (2017): "Hayek, Local Information, and Commanding Heights: Decentralizing State-Owned Enterprises in China," *American Economic Review*, 107, 2455–78.

JIANG, G., C. M. LEE, AND H. YUE (2010): "Tunneling Through Intercorporate Loans: The China Experience," *Journal of financial economics*, 98, 1–20.

KHANNA, T., AND Y. YAFEH (2007): "Business Groups in Emerging Markets: Paragons or Parasites?" *Journal of Economic Literature*, 45, 331–372.

LA PORTA, R., F. LOPEZ-DE SILANES, AND A. SHLEIFER (1999): "Corporate Ownership Around the World," *The journal of finance*, 54, 471–517.

LA PORTA, R., F. LOPEZ-DE SILANES, A. SHLEIFER, AND R. W. VISHNY (1998): "Law and Finance," *Journal of political economy*, 106, 1113–1155.

LARDY, N. R. (2019): *The State Strikes Back: The End of Economic Reform in China?*: Peterson Institute for International Economics.

LEMMON, M. L., AND K. V. LINS (2003): "Ownership Structure, Corporate Governance, And Firm Value: Evidence From the East Asian Financial Crisis," *The journal of finance*, 58, 1445–1468.

LEUTERT, W. (2016): "Challenges Ahead in China's Reform of State-Owned Enterprises," *Asia policy*, 83–100.

——— (2018): "The Political Mobility of China's Central State-Owned Enterprise Leaders," *The China Quarterly*, 233, 1–21.

LIN, L.-W., AND C. J. MILHAUPT (2013): "We Are the (National) Champions: Understanding the Mechanisms of State Capitalism in China," *Stanford Law Review*, 65, 697.

LIU, L., Y. WANG, AND Y. XU (2024): "A Practical Guide to Counterfactual Estimators for Causal Inference With Time-Series Cross-Sectional Data," *American Journal of Political Science*, 68, 160–176.

LJUNGQVIST, A., D. CHEN, D. JIANG, H. LU, AND M. ZHOU (2015): "State Capitalism vs. Private Enterprise,"Technical Report 20930, National Bureau of Economic Research.

LUO, L., Z. QI, AND P. HUBBARD (2017): "Not Looking for Trouble: Understanding Large-Scale Chinese Overseas Investment by Sector and Ownership," *China Economic Review*, 46, 142–164.

MORCK, R., D. WOLFENZON, AND B. YEUNG (2005): "Corporate Governance, Economic Entrenchment, and Growth," *Journal of economic literature*, 43, 655–720.

NAUGHTON, B. (2015): "The Transformation of the State Sector: SASAC, the Market Economy, and the New National Champions," in *State Capitalism, Institutional Adaptation and the Chinese Miracle* ed. by Naughton, B., and Tsai, K. S. Cambridge: Cambridge University Press, 46–71.

OPIE, W., G. G. TIAN, AND H. F. ZHANG (2019): "Corporate Pyramids, Geographical Distance, and Investment Efficiency of Chinese State-Owned Enterprises," *Journal of Banking & Finance*, 99, 95–120.

SUTHERLAND, D., AND L. NING (2015): "The Emergence and Evolution of Chinese Business Groups: Are Pyramidal Groups Forming?" in *State Capitalism, Institutional Adaptation, and the Chinese Miracle* ed. by Naughton, B., and Tsai, K. S. Cambridge: Cambridge University Press, 102–153.

WALTER, C. E. (2014): "Was Deng Xiaoping Right? An Overview of China's Equity Markets," *Journal of Applied Corporate Finance*, 26, 8–19.

WILLIAMSON, O. E. (1979): "Transaction-Cost Economics: The Governance of Contractual Relations," *The journal of Law and Economics*, 22, 233–261.

# A Appendix Tables

Appendix Table A1. Enterprise Groups and Subsidiary under Ministry of Finance

| Year | Enterprise Groups | | | | Subsidiary | | Average over All Groups | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | Identified | Have at least one subsidiary | Have at least one listed firm | Total | Listed firms | Number of subsidiaries | Number of listed firms | Hierarchy length |
| 2003 | 23 | 23 | 20 | 7 | 1,087 | 12 | 54.4 | 1.7 | 2.9 |
| 2007 | 23 | 23 | 19 | 6 | 1,443 | 14 | 75.9 | 2.3 | 3.5 |
| 2011 | 23 | 23 | 21 | 9 | 2,311 | 25 | 110.0 | 2.8 | 4.0 |
| 2015 | 23 | 23 | 22 | 10 | 6,093 | 30 | 277.0 | 3.0 | 4.9 |
| 2019 | 23 | 23 | 22 | 11 | 7,300 | 32 | 331.8 | 2.9 | 5.1 |

Note: See Table 5.

Appendix Table A2. Enterprise Groups and Subsidiary under State Council

| Year | Enterprise Groups | | | | Subsidiary | | Average over All Groups | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | Identified | Have at least one subsidiary | Have at least one listed firm | Total | Listed firms | Number of subsidiaries | Number of listed firms | Hierarchy length |
| 2003 | 144 | 144 | 78 | 2 | 3,270 | 2 | 41.9 | 1.0 | 1.8 |
| 2007 | 144 | 144 | 83 | 2 | 4,514 | 4 | 54.4 | 2.0 | 1.7 |
| 2011 | 144 | 144 | 89 | 2 | 4,154 | 4 | 46.7 | 2.0 | 1.8 |
| 2015 | 144 | 144 | 96 | 4 | 4,698 | 6 | 48.9 | 1.5 | 1.8 |
| 2019 | 144 | 144 | 99 | 5 | 4,630 | 8 | 46.8 | 1.6 | 2.1 |

Note: See Table 5.

Appendix Table A3. Distribution of 3-digit Industry in Finance Sector

| 3 digit industry | Number | Share of number in total (%) | Registered capital (Billion) | Share of capital in total (%) |
|---|---|---|---|---|
| Capital Investment Services | 268 | 32.25 | 212.29 | 25.31 |
| Non-monetary banking services | 127 | 15.28 | 286.80 | 34.20 |
| Other financial industry not specified | 89 | 10.71 | 45.19 | 5.39 |
| Futures market services | 52 | 6.26 | 23.52 | 2.80 |
| Other financial industry | 47 | 5.66 | 21.44 | 2.56 |
| Insurance intermediary services | 47 | 5.66 | 2.67 | 0.32 |
| Non-public securities investment funds | 45 | 5.42 | 32.23 | 3.84 |
| Securities Market Services | 31 | 3.73 | 44.15 | 5.26 |
| Financial trust and management services | 26 | 3.13 | 101.72 | 12.13 |
| Other Capital Market Services | 21 | 2.53 | 5.94 | 0.71 |

Note: The ten largest 3-digit industries of the finance sector are listed. The total share of these industries in terms of the total number of subsidiary and registered capital in the finance sector is more than 90%.

Appendix Table A4. Alternative Measures of the Financial Performance of Central SASAC: 2003-2019

| Resource: | Central SASAC websites (Lardy, 2019) | | | | Listed firms' consolidated financial statements | | | |
|---|---|---|---|---|---|---|---|---|
| Variable: | Asset | Profit | ROA | Liability/ Asset | Asset | Profit | ROA | Liability/ Asset |
| 2003 | – | – | – | – | 1,086.2 | 75.1 | 6.9 | 50.0 |
| 2004 | – | – | – | – | 1,305.0 | 113.6 | 8.7 | 51.4 |
| 2005 | – | – | – | – | 1,580.1 | 122.8 | 7.8 | 53.6 |
| 2006 | – | – | – | – | 1,945.1 | 150.3 | 7.7 | 55.9 |
| 2007 | – | – | – | – | 4,091.9 | 458.4 | 11.2 | 49.2 |
| 2008 | 17,628.8 | 696.2 | 3.9 | 58.4 | 5,230.7 | 272.9 | 5.2 | 52.0 |
| 2009 | 21,058.1 | 815.1 | 3.9 | 60.1 | 7,005.9 | 391.2 | 5.6 | 57.4 |
| 2010 | 24,427.5 | 1,136.4 | 4.7 | 60.8 | 8,397.3 | 572.9 | 6.8 | 58.8 |
| 2011 | 28,000.0 | 1,223.1 | 4.4 | 61.8 | 9,944.2 | 558.6 | 5.6 | 61.2 |
| 2012 | 31,333.9 | 1,300.0 | 4.1 | 62.8 | 11,664.1 | 527.2 | 4.5 | 63.1 |
| 2013 | 35,000.0 | 1,300.0 | 3.7 | 63.4 | 12,891.7 | 603.3 | 4.7 | 63.6 |
| 2014 | 38,700.0 | 1,400.0 | 3.6 | 62.8 | 14,313.0 | 581.8 | 4.1 | 64.1 |
| 2015 | 47,580.8 | 1,226.6 | 2.6 | 66.7 | 16,157.6 | 470.9 | 2.9 | 63.4 |
| 2016 | 50,479.4 | 1,232.7 | 2.4 | 66.7 | 18,153.0 | 531.7 | 2.9 | 64.1 |
| 2017 | 54,589.2 | 1,400.0 | 2.6 | 66.2 | 20,106.2 | 715.1 | 3.6 | 63.7 |
| 2018 | 58,084.5 | 1,700.0 | 2.9 | 65.7 | 23,536.0 | 912.0 | 3.9 | 63.9 |
| 2019 | 63,378.7 | 1,866.7 | 2.9 | 65.0 | 26,660.3 | 953.7 | 3.6 | 63.9 |

Note: The first 4 columns are from the Central SASAC website as Lardy (2019), which measures the total financial variables of all central SOEs under the Central SASAC (including headquarters and subsidiaries). The last 4 columns are from the CSMAR data, which measures the consolidated financial variables of all listed companies belonging to central SOEs. The consolidated financial variables aggregate the financial variables of the headquarters (listed) and subsidiaries and remove the inter-transaction profit. Asset and Profit in Billion Renminbi. ROA and Liability/Asset ratio are in 100%.

Appendix Table A5. Summary Statistics at Subsidiary and Group Level

| VARIABLES | (1) N | (2) S.D. | (3) Mean | (4) Max | (5) Min |
|---|---|---|---|---|---|
| Panel A: Subsidiary Level | | | | | |
| Ln(asset) | 149,514 | 2.003 | 4.208 | 9.382 | −1.049 |
| ROA | 149,514 | 0.217 | 0.075 | 2.196 | −0.585 |
| Level of tier | 149,514 | 1.076 | 2.776 | 9.000 | 1.000 |
| Subsidiary-level VI | 149,514 | 0.080 | 0.044 | 0.450 | 0.000 |
| Minority investor | 149,514 | 0.483 | 0.369 | 1.000 | 0.000 |
| Listed | 149,514 | 0.076 | 0.006 | 1.000 | 0.000 |
| Listed, sub | 149,514 | 0.449 | 0.281 | 1.000 | 0.000 |
| Panel B: Group Level | | | | | |
| Ln(asset) | 606 | 2.005 | 10.955 | 15.015 | −0.083 |
| ROA | 606 | 0.032 | 0.031 | 0.444 | −0.115 |
| Tier length | 606 | 1.511 | 4.419 | 9.000 | 1.000 |
| # of listed firms | 606 | 2.445 | 1.896 | 15.000 | 0.000 |
| Group-level VI | 606 | 0.061 | 0.053 | 0.331 | 0.001 |

Note: Authors calculated based on the Business Registry Data and the Inspection Data.

Appendix Table A6. Total Investments of Groups under the Ministry of Finance

| Year | Total Investment | Share of Total Investment(%) | | | |
|---|---|---|---|---|---|
| | | ODI | Incumbent | New | Domestic Acquisition |
| 2004 | 0.02 | 8.52 | 20.17 | 59.22 | 12.09 |
| 2005 | 0.08 | 0.66 | 1.67 | 93.06 | 4.61 |
| 2006 | 0.17 | 16.83 | 15.43 | 41.28 | 26.47 |
| 2007 | 0.54 | 19.79 | 8.77 | 50.80 | 20.65 |
| 2008 | 0.08 | 21.09 | 32.64 | 26.78 | 19.49 |
| 2009 | 0.66 | 13.31 | 4.70 | 46.93 | 35.05 |
| 2010 | 0.54 | 8.46 | 47.79 | 21.30 | 22.44 |
| 2011 | 0.33 | 18.24 | 19.85 | 23.21 | 38.71 |
| 2012 | 0.21 | 20.67 | 20.12 | 39.41 | 19.80 |
| 2013 | 0.26 | 13.18 | 35.44 | 27.21 | 24.17 |
| 2014 | 1.49 | 2.68 | 7.70 | 70.81 | 18.80 |
| 2015 | 1.74 | 5.89 | 7.02 | 55.35 | 31.74 |
| 2016 | 2.16 | 4.79 | 23.47 | 55.79 | 15.95 |
| 2017 | 1.27 | 9.92 | 43.33 | 30.21 | 16.53 |

Note: See Table 28.

Appendix Table A7. Total Investments of Groups under the State Council

| Year | Total Investment | Share of Total Investment(%) | | | |
|---|---|---|---|---|---|
| | | ODI | Incumbent | New | Domestic Acquisition |
| 2008 | 0.21 | 0.16 | 40.00 | 57.03 | 2.80 |
| 2010 | 0.81 | 1.53 | 14.82 | 78.25 | 5.40 |
| 2014 | 0.85 | 1.51 | 56.05 | 39.06 | 3.38 |
| 2015 | 0.73 | 0.10 | 60.42 | 12.12 | 27.36 |
| 2016 | 0.73 | 0.25 | 72.61 | 8.30 | 18.85 |
| 2017 | 2.52 | 0.00 | 87.50 | 5.82 | 6.67 |

Note: See Table 28