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Article

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Does overcapacity prompt controlling shareholders to play a propping role for listed companies?

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ABSTRACT

A major risk currently facing the Chinese economy is overcapacity, which affects the efficiency of social resource allocation (Xi et al., 2017; Huang et al., 2019). When a company is in crisis, the internal capital market often plays a propping role. This study approached this issue from the perspective of the controlling shareholder and examined whether controlling shareholders provide financial support to enterprises in industries with excess capacity. According to the data for China's A-share listed companies from 2007 to 2019, companies in industries with excess capacity received more financial support from controlling shareholders compared with those in non-overcapacity industries. Analysis of the mechanism revealed that state-owned enterprises and companies with relatively poor financial status received more financial support from controlling shareholders. This study also examined the economic consequences of such support and found that it is conducive to enhancing enterprise value. This study enriches the literature on overcapacity and internal capital markets by demonstrating that internal capital markets play a propping role for companies facing industry-level crises. This finding has both theoretical value and practical implications related to supply-side reform and capacity reduction.

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1. Introduction

Along with local government debt and real estate bubbles, overcapacity is one of the three major risks facing China's economy (Zhang and Jiang, 2017). Overcapacity affects the efficiency of social resource allocation (Xi et al., 2017; Huang et al., 2019) and is essentially a problem of structural imbalance; that is, a mismatch

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between supply and demand. This has become an important factor hindering China's economic development. To address overcapacity and the related economic problems, the government has put forward a supply-side reform proposal; the reforms would start from the production and supply side, with the goal of improving the quality of supply (and hence the quality of economic development) through structural adjustments.

In addition to attracting the attention of the market and government, the problem of overcapacity has long been of interest to academics. The literature mainly focuses on the calculation of overcapacity (Yu et al., 2018; Zhang and Jiang, 2017; Han et al., 2011), its causes (Ma et al., 2018; Xi et al., 2017; Bai, 2016; Guo, 2016; Shen et al. 2012; Jiang et al. 2012; Lin et al. 2010; Zhou and Sheng, 2007; Liu, 2006), and countermeasures (Xu and Zhou, 2015). How to deal with the market risks of overcapacity is an urgent issue for companies, yet there have been few in-depth investigations of this problem in the literature. Wang and Bai (2017) found that companies can expand into overseas markets to deal with overcapacity in their industry. However, there are many obstacles to overseas expansion, including technical barriers, institutional barriers, and institutional distance. In particular, heightened tensions in the global economy since the subprime mortgage crisis have led to greater competition among regional economies. As a result, companies face dual risks: domestic operating risks caused by sluggish domestic demand and uncertainties in overseas investment.

Against a backdrop of heightened risks in both the domestic and overseas markets, how can companies deal with the impact of industry overcapacity on business activities? We investigated this issue from the perspective of internal capital markets. According to the literature, internal capital markets often play a propping role for companies in crisis. Listed companies facing financial difficulties or that need refinancing receive support from major shareholders in the form of related-party transactions (Jian and Wong, 2010; Jia et al., 2013). In their examination of Indian business groups, Gopalan et al. (2007) found that member companies in financial crisis are often rescued by the group. Business groups use internal fund transfers to support poorly performing member companies to avoid default problems. During crises, large shareholders often have a strong sense of stewardship; the higher their shareholding ratio, the stronger their stewardship function is (Lian et al., 2012). Controlling shareholders can help ease financing constraints on listed companies by providing financial support, particularly during a company's growth phase or during the recovery period after a recession (Tan et al., 2018).

Research on the propping role of the internal capital market has mainly focused on corporate-level crises and macro-financial crises. When a company faces an industry-level crisis, does the internal capital market still exert a propping effect? This study approached this question by considering overcapacity as the institutional background. According to data on China's A-share listed companies from 2007 to 2019, enterprises in industries with excess capacity received more financial support from controlling shareholders compared with those in non-overcapacity industries. Further analysis showed that such support from controlling shareholders mainly occurred in state-owned enterprises. In addition, enterprises with relatively poor financial status received more financial support. This study also found that such support is conducive to enhancing enterprise value.

This study makes two major contributions. First, it enriches the literature on overcapacity. Most studies on overcapacity have focused on its calculation (Yu et al., 2018; Zhang and Jiang, 2017; Han et al., 2011), its underlying causes (Ma et al., 2018; Xi et al., 2017; Bai, 2016; Guo, 2016; Shen et al., 2012; Jiang et al., 2012; Lin et al., 2010; Zhou and Sheng, 2007; Liu, 2006), and related characteristics and risks (Policy Research Group of the Development Research Center of the State Council, 2015). Less attention has been paid to the economic consequences of overcapacity (Xu and Zhou, 2015; Wang and Bai, 2017), especially its impact on corporate behavior. By examining overcapacity from the perspective of internal capital market operations, this paper broadens the understanding of the economic consequences of overcapacity.

Second, this article enriches the literature on the internal capital market. Related studies have mainly focused on the efficiency of internal capital markets (Stein, 1997) and the tunneling behavior of controlling shareholders (Johnson et al., 2000). Most have adopted the perspective of corporate governance, exploring how corporate governance factors affect internal capital. Few studies have examined the operation of the internal capital market from the perspective of the external environment. Regarding the propping role of the internal capital market in crisis situations, the literature has mainly examined the Asian financial crisis (Almeida et al., 2015) and the European sovereign debt crisis (Raffaele et al., 2020). This article deepens

the understanding of the propping role of the internal capital market by exploring the issue from the perspective of overcapacity.

The remainder of this article is organized as follows. [Section 2](#) summarizes the institutional background, and [Section 3](#) presents the literature review and theoretical hypotheses. [Section 4](#) describes the research design. [Section 5](#) presents the empirical results, and further analysis of the mechanism is presented in [Section 6](#). [Section 7](#) concludes the article.

2. Background

2.1. Overcapacity

The Chinese economy is currently in a period of transition, and one of the key factors hindering its development is the imbalance of the economic structure. The imbalance is mainly a consequence of excess low-end production capacity. Along with local government debt and real estate bubbles, overcapacity is one of the three major risks facing China's economy ([Zhang and Jiang, 2017](#)). Overcapacity, which affects the efficiency of social resource allocation ([Xi et al., 2017](#)), was believed by the earliest scholars to refer to the excess capacity that still exists during a period of maximum demand ([Bain, 1962](#)). Now, Chinese scholars generally understand overcapacity to refer to excess production capacity or the under-utilization of existing capacity ([Zhou and Sheng, 2007](#)). Full utilization of production capacity/equipment does not necessarily mean a 100% utilization rate; for an industry to be in overcapacity, its utilization rate only has to be lower than optimal after considering technical characteristics and demand conditions.

In the United States and Europe, capacity utilization rates are typically between 79% and 83% under normal (i.e., non-excess capacity) conditions. If the rate is more than 90%, capacity is considered to be insufficient, and the overloading of production equipment can occur. If the rate is lower than 79%, there may be overcapacity ([Han et al., 2011](#)). In China, the industries facing overcapacity mainly include ferrous metals, non-ferrous metals, petrochemical coking, chemical raw materials, non-metallic mineral products, and chemical fibers and paper products ([Han et al., 2011](#)).

Regarding the causes of overcapacity, there are generally two views, the first being the market mechanism theory ([Lin et al., 2007](#); [Zhou and Sheng, 2007](#); [Lin et al., 2010](#); [Jiang et al., 2012](#); [Policy Research Group of the Development Research Center of the State Council, 2015](#)). When the economy transitions from prosperity to recession, total social demand shrinks, but the withdrawal of production capacity occurs with a time lag. As a result, investment demand growth is stronger than the withdrawal of production capacity caused by shrinking demand, leading to a state of excess production capacity. The other view is the government promotion theory. Under this view, overcapacity has accompanied China's economic transition in large part because of the unreasonable investment system and the government's strong will to participate in industrial investment ([Zhou and Sheng, 2007](#); [Geng et al., 2011](#); [Jiang et al., 2012](#); [Wang et al., 2014](#); [Yu and Lv, 2015](#)), along with other factors (e.g., financial convenience, sunk costs, enterprise size, and employment flexibility) also playing a role ([Ma et al., 2018](#)).

To address overcapacity and other economic problems, the Chinese government has put forward a proposal for supply-side reforms. The structural imbalance between supply and demand has become the biggest roadblock to the continued growth of China's economy and, as such, cannot be ignored. On one hand, excess capacity is a major burden restricting China's economic transformation. On the other hand, the supply system in China is incompatible with the demand side. Generally, there is a surplus of low-end products and an insufficient supply of high-end products. In addition, China's supply side is inefficient and cannot meet demand. In this regard, the government has proposed a major macro-control policy for supply-side reforms; the reforms would start from the production and supply side, with the goal of improving the quality of supply (and hence the quality of economic development) through structural adjustments.

2.2. Financial support

According to the *Shanghai Stock Exchange Information Disclosure Announcement Category Registration Guidelines*, financial support generally refers to an entity directly or indirectly providing its own monetary

funds or other forms of assets to other entities in a certain manner or under certain conditions. The usage fee charged is lower than the industry average. This behavior is not directly related to daily production and business activities, including borrowing or entrusting loans, providing labor services or the right to use assets, and assuming expenses.

The provision of external financial support by listed companies is a strictly regulated behavior. The *Guidelines for Standardized Operation of the Shenzhen Stock Exchange* clearly stipulate that listed companies shall not provide financial support to related parties such as directors, supervisors, senior managers, controlling shareholders, actual controllers, and their controlled subsidiaries. Furthermore, the *Company Law of the People's Republic of China* stipulates that companies shall not directly or through subsidiaries provide loans to directors, supervisors, and senior managers. In addition, under the *Notice on Regulating Funds Exchanges between Listed Companies and Related Parties and Several Issues Concerning External Guarantees of Listed Companies*, listed companies shall not directly or indirectly provide funds to controlling shareholders and other related parties. The *Administrative Measures for Equity Incentives* stipulates that listed companies shall not provide loans or any other forms of financial support for incentive objects to obtain relevant rights and interests in accordance with the equity incentive plan, including providing guarantees for their loans.

Accordingly, listed companies must strictly abide by all relevant regulations when providing financial support. When a listed company provides external financial support, it must sign an agreement with the funding target and other relevant parties, stipulating conditions, the amount of financial support, the time limit, and the liability for breach of contract. The Shenzhen Stock Exchange requires that more than two-thirds of the directors present at the board meeting agree and pass resolutions to provide financial support to external parties, and they are required to meet information disclosure obligations in a timely manner. When a board of directors deliberates on financial support matters, independent directors and sponsors (if any) are required to express independent opinions on the legality and compliance of the matters, the impact on the company, and the risks. A review by the general meeting of shareholders is required if certain conditions are met: (1) the most recent audited asset-liability ratio of the funded objects exceeded 70%; (2) the amount of financial support or the cumulative amount of financial aid provided for 12 consecutive months exceeds 10% of the company's most recent audited net assets; and (3) other circumstances stipulated by the exchange or the company's articles of association.

However, regulatory authorities do not impose equally stringent restrictions on listed companies' acceptance of financial support. Rather, they have adopted a supportive stance in terms of the approval process and interest expenses. Under the regulations, a listed company's acceptance of financial support from related parties may be exempt from submission to the general meeting of shareholders for deliberation, but the company must promptly disclose and fully explain the reasons for the gratuitous provision and whether there are other agreement arrangements. According to the *Shanghai Stock Exchange Implementation Guidelines for Related Transactions of Listed Companies*, the interest rate applied to financial support from related parties cannot be higher than the benchmark lending rate for the same period set by the People's Bank of China, and the listed company may apply to the exchange for exemption from review and disclosure when there is no corresponding mortgage or guarantee for the funding.

Thus, financial support can include not only support provided by listed companies to external parties but also aid received by listed companies from stakeholders. This study examined controlling shareholders' funding behaviors toward listed companies from the perspective of the controlling shareholder. Financial support from controlling shareholders is one method of resource allocation in the internal capital market, and it has no direct relationship with the normal business activities of the enterprise.

3. Literature review and theoretical hypotheses

3.1. Literature review

3.1.1. Overcapacity

Studies on overcapacity have mainly focused on its calculation (Yu et al., 2018; Zhang and Jiang, 2017; Han et al., 2011), reasons for its formation (Ma et al., 2018; Xi et al., 2017; Bai, 2016; Guo, 2016; Shen et al., 2012; Jiang et al., 2012; Lin et al., 2010; Zhou and Sheng, 2007; Liu, 2006), related characteristics

and risks (Policy Research Group of the Development Research Center of the State Council, 2015), and countermeasures (Xu and Zhou, 2015). Less attention has been paid to the economic consequences of overcapacity, especially its impact on corporate behavior.

For the calculation of overcapacity, the key to distinguishing between an appropriate level of idle capacity and overcapacity lies in the identification of reasonable limits. In the literature, there is no unified standard for this so-called reasonable limit. Europe and the United States generally use capacity utilization as the main indicator of overcapacity. The capacity/equipment utilization rate is the direct response of the manufacturer to the degree of utilization of input factors; if the value of this indicator is large, the utilization degree of input elements is high. Otherwise, some elements are idle, or management coordination of the production chain has not reached the optimal level. In Europe and the United States, equipment utilization rates are generally between 79% and 83% under normal circumstances. A rate higher than 90% could be an indicator of insufficient production capacity/overdrawn equipment, whereas a rate lower than 79% could indicate overcapacity (Han et al., 2011). Currently, the main methods of calculating capacity utilization are peak to peak, minimum cost analysis, data envelopment analysis, and production capacity utilization (Han et al., 2011; Zhang and Jiang, 2017).

The causes of overcapacity include market and non-market factors. Lin et al. (2010) proposed a micro-theoretical basis of the surge phenomenon and analyzed the formation mechanism of overcapacity from the perspective of enterprise investment decision-making. The authors argued that, due to incomplete information about an industry at the time of investment (especially regarding the total number of enterprises in the industry), a positive consensus view on the industry's growth prospects will trigger a large amount of social investment concentrated on the relevant industry, leading to overcapacity problems. If the consensus view strengthens or if the industry's growth outlook improves further, more corporate and social investments will flow into the industry, exacerbating the problem of overcapacity.

Under the current decentralized system, promotion incentives provide local government officials a very strong motivation to promote the rapid development of the local economy (Zhou, 2004). Against this backdrop, economic efficiency is not the primary concern. In China, local governments are mainly accountable to the upper (not lower) echelons; driven by yardstick competition for positive assessments by higher-level governments, they inevitably introduce various investment promotion policies and methods to attract investment. This leads to some degree of vicious investment competition, which increases domestic production capacity and ultimately results in overcapacity in the national market. Indeed, local governments' promotion of investments in major industries is the root cause of overcapacity (Jiang et al., 2012; Wang et al., 2014; Yu and Lv, 2015). Besides the government's will to grow the economy, another cause of overcapacity is the rent-seeking behavior of local governments. When rent-seeking behavior is added to the decision model, the optimal output decision of an enterprise decreases (He, 2006). Rent-seeking behavior causes the actual production capacity of a company to be lower than the designed production capacity, and the greater the weight of rent-seeking, the more serious the under-utilization of capacity.

Regarding the impact of overcapacity on enterprises, Wang and Bai (2017) found that institutional overcapacity drives enterprises to invest directly. The rationale is that, because overcapacity is due to oversupply on one hand and weak domestic demand on the other, expanding the market helps digest excess capacity. More attention needs to be paid to the other effects of overcapacity on corporate behavior. Among the questions in need of investigation is how companies facing overcapacity crises can improve their risk resilience. Although this can be a life or death question for enterprises in industries with excess capacity, it has not yet been answered in the literature. This study approaches this question from the perspective of controlling shareholders' financial support. Can a company in an industry facing overcapacity receive support from the internal capital market, and if so, what is the mechanism of action?

3.1.2. Internal capital markets

Internal capital markets have three types of positive effects. First, they have the advantage of information symmetry, which is conducive to reducing group financing costs and thus promoting group financing efficiency. Second, by selecting winners, internal capital markets help optimize the overall efficiency of business groups' resource allocation. Third, when a member company is in financial distress, the group's internal

capital market exerts a propping effect through cross-subsidies. This not only helps resolve crises facing member companies but also helps prevent local crises from spreading to the group level.

(1) Reducing information asymmetry and financing costs

The information asymmetry between enterprises and the external capital market is the root cause of internal capital markets (Richardson, 1960; Alchian, 1969; Williamson, 1975). Internal capital markets not only can reduce information asymmetry and transaction costs through internalization but also have an important role in concentrating funds and improving the overall financing environment of enterprises.

The effectiveness of internal capital markets has been proven by a large body of literature (Stiglitz and Weiss, 1981; Myers and Majluf, 1984; Greenwald et al., 1984; La Porta et al., 1998). In the presence of an incomplete external market, internal markets in business groups can replace missing parts of the external market, thereby increasing the value of enterprises (Leff, 1978; Khanna and Palepu, 2000). The established relationships between parties lead to lower information asymmetry and higher trust, which is helpful in reducing transaction costs (Jian and Wong, 2010). Gertner et al. (1994) pointed out that centralized financing arrangements and asset resetting by corporate headquarters have regulatory and information advantages and are more efficient (and involve less friction) than bank financing arrangements.

In emerging economies, there tends to be more serious information asymmetry between companies and capital providers (and higher transaction costs for companies) because of the lack of investor protection measures, the smaller number of financial intermediaries, and flaws in information disclosure. This leads to friction in the capital market. Bank financing tends to be inefficient and hard to secure, and it is more difficult for companies to obtain equity financing from the capital market. The high cost of obtaining external funds in emerging economies puts financing constraints on companies (Stiglitz and Weiss, 1981; Myers and Majluf, 1984; Greenwald et al., 1984; La Porta et al., 1998), which explains the large number of enterprise groups and widespread use of internal capital markets in such countries. By allocating capital among subsidiaries, internal capital markets bring economic benefits to enterprise groups (Wang and Zou, 2009).

(2) Improving the efficiency of group resource allocation through winner-picking

Corporate headquarters can secure more external funding sources through their centralized financing advantage and also engage in winner-picking by allocating funds to member companies with greater investment opportunities or by transferring funds from low-yield to high-yield projects. The analytical model of Stein (1997) showed that the internal capital market has both a more money effect and a smarter money effect; that is, corporate headquarters can not only secure more external funding sources due to their centralization advantage, but also engage in winner-picking activities to improve the efficiency of capital allocation.

(3) Resolving business crises of member companies through cross-subsidies

Friedman et al. (2003) argued that controlling shareholders do not always hollow out companies through tunneling; rather, they can also prop up companies. A listed company in financial distress or in need of financing can receive support from major shareholders in the form of related-party transactions (Jian and Wong, 2010; Jia et al., 2013). In their examination of Indian business groups, Gopalan et al. (2007) found that member companies in financial crisis can often be rescued by the group. Business groups use internal fund transfers to support poorly performing member companies to avoid default problems. During crises, large shareholders often have a strong sense of stewardship; the higher their shareholding ratio, the stronger their stewardship function is (Lian et al., 2012). Controlling shareholders can help ease financing constraints on listed companies by providing financial support, particularly during a company's growth phase or during the recovery period after a recession (Tan et al., 2018). Riyanto and Toolsema (2008) argued that controlling shareholders' support for a company represents an insurance mechanism for minority shareholders, and it is precisely because of this insurance mechanism that minority shareholders are willing to invest in the company.

When the crisis facing a company is not from within but rather from the external environment, such as industry overcapacity, does the internal capital market still play a propping role? If so, what is the mechanism?

This study empirically investigates these questions to identify the mechanism of controlling shareholders' propping actions.

3.2. Theoretical hypothesis

3.2.1. Overcapacity and financial support from controlling shareholders

The intuition behind this article is that, when an industry faces an overcapacity crisis, companies in that industry will receive support from controlling shareholders to help them weather the crisis. The rationale is as follows.

First, overcapacity exposes companies to higher operating risks. On one hand, market demand is lower than industry supply, which leads to more intense market competition and worsens the external operating environment of enterprises. On the other hand, oversupply causes product prices to fall and corporate profitability to be impaired, hurting business performance. Under the guidance of supply-side reforms, enterprises in industries facing overcapacity are subject to macro-control and industrial policies (e.g., the removal of excess capacity). At the same time, industries with excess capacity are undergoing restructuring, and merger and acquisition activities are high. Against this backdrop, companies can face severe competition. When an industry faces an overcapacity crisis, companies operating in that industry face a series of risks, such as poor sales, inventory backlogs, rising costs, and falling product prices. With fierce industry competition posing a serious threat to their operation and survival, listed companies need to seek financial support from controlling shareholders.

Second, controlling shareholders have natural attributes that lead to their provision of support to companies in crisis. The propping role of internal capital markets has been demonstrated by many studies (Gopalan et al., 2007; Lian et al., 2012; Almeida et al., 2015; Tan et al., 2018; Raffaele et al., 2020). When a company was trapped in industrial level crisis, business risk may stimulate the stewardship consciousness of large shareholders. This kind of consciousness is not only from the listed company, but also from the overall interest of the group. If the listed company could not survive from the crisis, the group would be negatively affected. This will damage the controlling shareholder's return. Financial support may help companies stop losses and benefit large shareholders in the longer term.

Third, the special status of listed companies makes support from internal capital markets a necessity. In the Chinese capital market, enterprise groups include both listed companies and nonlisted companies. Listed companies often have a pivotal position in business groups, being not only important financing platforms but also signboards of the group. Compared with nonlisted companies, listed companies often attract very high market attention; operating performances are keenly watched by small and medium shareholders, regulatory authorities, the media, and competitors. In addition, under the share issuance approval system, it is not easy for companies to qualify for listing. According to Gopalan et al. (2007), local risks facing a member company can easily escalate to the group level; for example, bankruptcy risks can spread from one member company to other member companies. Once a risk occurs, it may spread much more quickly among listed companies than among nonlisted companies. Therefore, in view of the special market position of listed companies and their risk aversion motive, controlling shareholders are likely to come to their aid. Therefore, we propose the following hypothesis.

H1. Compared with non-overcapacity industries, controlling shareholders provide more financial support to listed companies in industries facing overcapacity.

3.2.2. Nature of property rights, overcapacity, and financial support

Government intervention is an important cause of overcapacity (Geng et al., 2011; Jiang et al., 2012; Wang et al., 2014; Yu and Lv, 2015). Under the dual pressures of local economic competition and promotional activities of local officials, local governments tend to attract unlimited investments during periods of economic expansion. Such an unreasonable investment system, combined with the government's strong will to participate in industrial investment, leads to blind expansion of capacity. At a certain point, vicious investment competition leads to a continued increase in accumulated domestic production capacity and causes overcapacity in the national market (Zhou and Sheng, 2007; Zhang et al., 2010). For this reason, it is reasonable to assume

that state-owned enterprises may be more seriously affected by overcapacity than non-state-owned enterprises in the same industry. In addition, under the influence of supply-side reforms, state-owned enterprises have a stronger motivation to cooperate with macro adjustment measures. This drive is also because of the dual considerations of local competition and the promotional activities of officials. State-owned enterprises not only face more serious overcapacity problems but are under more pressure to reduce production capacity. Thus, compared with non-state-owned enterprises, state-owned enterprises are more likely to receive financial support from controlling shareholders. Therefore, we propose the following hypothesis.

H2. Compared with non-state-owned enterprises, state-owned enterprises in the same overcapacity industry receive more financial support from controlling shareholders.

3.2.3. *Financial status, overcapacity, and financial support*

Regardless of the reason for the formation of overcapacity, the external operating risks faced by enterprises in the same overcapacity industry are similar. External operating risks become internalized, having a negative impact on the financial status of enterprises. This forms the basis for controlling shareholders' decision to provide financial support. When an industry faces a crisis of overcapacity, companies operating in that industry also face a series of risks, such as poor sales, inventory backlogs, rising costs, and falling product prices. In addition, they may also face industry restructuring risks (e.g., mergers and acquisitions). With the cleanup of low-end production capacity, some companies will inevitably withdraw from the market because of the normal functioning of the survival-of-the-fittest mechanism. When the market exit risk increases, industry competition further intensifies. Studies have found that companies facing fierce market competition have stronger incentives to increase cash holdings, such as by obtaining commercial credit support (Chen, 2017; Wu et al., 2017) and seeking government subsidies (Kong et al., 2013). In view of this, controlling shareholders are more likely to provide financial support.

However, this raises an important question: in industries facing overcapacity, do controlling shareholders support companies with a higher exit risk or those with a lower exit risk? Answering this question requires us to return to the two main principles of resource allocation in internal capital markets. In the operation of internal capital markets, resources may be allocated to more efficient or less efficient departments. The former approach is called winner-picking. In winner-picking, corporate headquarters transfer funds from low-yield projects to high-yield projects, thereby improving the efficiency of capital allocation at the group level (Stein, 1997). The latter approach is an example of a cross-subsidy; under this method, enterprise groups use internal fund transfers to support poorly performing member companies to avoid default problems and prevent local risks from escalating into group risks.

When considering listed companies, it is reasonable to assume that controlling shareholders will provide more funding to companies with poor financial status. The rationale is that listed companies are a group of market winners that have been rigorously screened by the market. Although the quality of listed companies varies, their overall quality in the entire market is higher than the market average. Therefore, controlling shareholders may provide more financial support to listed companies with poor financial status. Based on this, we propose the following hypothesis.

H3. Controlling shareholders provide more financial support to companies in industries facing overcapacity when those companies have poor financial status.

3.2.4. *Economic consequences of financial support from controlling shareholders*

It seems that companies capable of withstanding overcapacity risks have a higher probability of increasing their corporate value. First, the survival-of-the-fittest mechanism created by overcapacity will gradually clear out relatively weak companies, leading to fewer competitors. Second, companies that demonstrate an ability to survive under such conditions are likely to have strong capabilities in general, with strong management and resilience. In addition, after enduring overcapacity and market restructuring, the industry in question may have better overall efficiency. Therefore, we propose the following hypothesis.

H4. When controlling shareholders provide financial assistance to listed companies operating in an industry with excess capacity, the assistance is conducive to enhancing the companies' corporate value.

4. Research design

4.1. Data and samples

Using the data of A-share listed companies from 2007 to 2019, an initial sample of 34,400 observations was obtained. The sample was then screened by deleting 688 observations from the financial industry and 2490 observations with missing data. In the empirical process, the dependent variable lags by one period. In the end, 27,180 company annual observations were obtained. All of the continuous variables were winsorized at the 1% levels.

All financial data were obtained from the China Stock Market & Accounting Research (CSMAR) and Wind databases.

4.2. Models and variables

To test H1, the following multivariate empirical analysis model (1) was established.

$$Prop_{i,t+1} = \beta_0 + \beta_1 Overcap_{i,t} + \sum Control_{i,t} + \varepsilon_{i,t} \quad (1)$$

The explained variable is the financial support from controlling shareholders ($Prop_{i,t+1}$).

$Prop$ = (other payable to controlling shareholders + long-term payable to controlling shareholders) / total assets at the end of the period * 100%

In a robustness analysis, the short-term funding ($Sh_Prop_{i,t+1}$) and net funding ($Net_Prop_{i,t+1}$) of controlling shareholders were used.

Sh_Prop = other payable to controlling shareholders / total assets at the end of the period * 100%

Net_Prop = (other payable to controlling shareholders + long-term payable to controlling shareholders – other receivable from controlling shareholders – long-term receivable from controlling shareholders) / total assets at the end of the period * 100%

The explanatory variable is overcapacity ($Overcap_{i,t}$). Following Xi et al. (2017), the following overcapacity industries were identified: ferrous metals, non-ferrous metals, petrochemical coking, chemical raw materials, mineral products, chemical fibers and paper products, coal mining and washing, ferrous metal mining and processing, oil and natural gas extraction, non-metallic mining, non-ferrous metal mining, electric power, and heat production and supply. A dummy variable was used to identify whether a company operates in one of these overcapacity industries: if so, it was assigned a value of 1 and 0 otherwise.

In the empirical analysis model, this study controlled companies' financial characteristics, major shareholder characteristics, and corporate governance characteristics, including the nature of property rights ($Soe_{i,t}$), company size ($Size_{i,t}$), profitability ($Roe_{i,t}$), asset-liability ratio ($Lev_{i,t}$), cash flow level ($Cash_{i,t}$), enterprise age ($Age_{i,t}$), market to book ratio ($MB_{i,t}$), power of major shareholders ($Top1_{i,t}$), management power ($Dual_{i,t}$), international "big four" auditor ($Big4_{i,t}$), board governance ($Board_{i,t}$), proportion of independent directors ($Independ_{i,t}$), equity checks and balances ($Balance_{i,t}$), year fixed effects ($Year_{i,t}$), and industry fixed effects ($Industry_{i,t}$). The variable definitions and calculation processes are shown in Table 1.

If H1 is true, then β_1 should be positive. To eliminate possible heteroscedasticity problems, we conducted a robustness analysis, and time series dependence was corrected by company-level clustering.

Table 1
Variable definitions.

Variable	Abbreviation	Definition
Explained variable	<i>Prop</i>	(Other payable to controlling shareholders + long-term payable to controlling shareholders) / total assets at the end of the period *100%
	<i>Net_Prop</i>	(Other payable to controlling shareholders + long-term payable to controlling shareholders – other receivable from controlling shareholders – long-term receivable from controlling shareholders) / total assets at the end of the period * 100%
Explanatory variable	<i>Sh_Prop</i>	Other payable to controlling shareholders / total assets at the end of the period * 100%
	<i>Overcap</i>	Dummy variable; if the company is in an overcapacity industry, assign a value of 1, otherwise 0
Other variables	<i>Soe</i>	Dummy variable; if the company is a state-owned enterprise, assign a value of 1, otherwise 0
	<i>Zscore</i>	Financial status; the higher the Z-score index, the better the corporate financial status
	<i>Size</i>	Natural logarithm of total assets
	<i>Roe</i>	Return on equity
	<i>Cash</i>	Net cash flow at the end of the period / total assets at the end of the period
	<i>Lev</i>	Total liabilities / total assets
	<i>Age</i>	Accounting period – year of company establishment
	<i>MB</i>	Total market value / total assets
	<i>Balance</i>	The ratio between the shareholding ratios of the second to 10th largest shareholders and that of the largest shareholder
	<i>Top1</i>	Shareholding ratio of the largest shareholder
	<i>Big4</i>	Dummy variable; if the auditor is a big four international accounting firm, assign a value of 1, otherwise 0
	<i>Board</i>	Number of board members
	<i>Year</i>	Year fixed effect
<i>Industry</i>	Industry fixed effect	

Table 2
Descriptive statistics.

Variable	Entire sample N = 27,180		Non-overcapacity N = 21,275	Overcapacity N = 5905	
	Mean	SD	Mean	Mean	T-test
<i>Prop</i>	0.52	2.038	0.479	0.668	–0.189***
<i>Sh_Prop</i>	0.457	1.837	0.437	0.529	–0.092***
<i>Net_Prop</i>	0.506	2.03	0.466	0.649	–0.182***
<i>Overcap</i>	0.217	0.412	0	1	
<i>Soe</i>	0.404	0.491	0.363	0.55	–0.188***
<i>Size</i>	21.971	1.279	21.881	22.298	–0.418***
<i>Roe</i>	0.061	0.139	0.065	0.048	0.017***
<i>Cash</i>	0.042	0.074	0.039	0.054	–0.015***
<i>Lev</i>	0.433	0.21	0.422	0.473	–0.051***
<i>Age</i>	9.213	6.775	8.969	10.091	–1.122***
<i>Top1</i>	0.353	0.15	0.348	0.372	–0.024***
<i>MB</i>	4.017	3.657	4.161	3.497	0.664***
<i>Balance</i>	0.875	0.767	0.901	0.779	0.122***
<i>Board</i>	8.737	1.743	8.639	9.089	–0.450***
<i>Dual</i>	0.255	0.436	0.271	0.197	0.075***
<i>Independ</i>	0.372	0.052	0.373	0.367	0.006***
<i>Big4</i>	0.055	0.228	0.051	0.07	–0.019***

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

5. Empirical analysis results

5.1. Descriptive statistics

The descriptive statistics of the variables are shown in Table 2. For listed companies, the average value of financial support from controlling shareholders is 0.52%. In addition, companies in industries facing

Table 3
Correlation coefficient matrix.

	<i>Prop</i>	<i>Sh_Prop</i>	<i>Net_Prop</i>	<i>Overcap</i>	<i>Soe</i>	<i>Size</i>	<i>Roe</i>	<i>Cash</i>	<i>Lev</i>	<i>Age</i>	<i>Top1</i>	<i>MB</i>	<i>Balance</i>	<i>Board</i>	<i>Dual</i>	<i>Independ</i>	<i>Big4</i>
<i>Prop</i>	1																
<i>Sh_Prop</i>	0.9541*	1															
<i>Net_Prop</i>	0.9964*	0.9505*	1														
<i>Overcap</i>	0.0382*	0.0206*	0.0370*	1													
<i>Soe</i>	0.1203*	0.1083*	0.1182*	0.1577*	1												
<i>Size</i>	-0.0114	-0.0283*	-0.0136	0.1347*	0.3260*	1											
<i>Roe</i>	-0.1002*	-0.1070*	-0.0992*	-0.0516*	-0.0360*	0.1007*	1										
<i>Cash</i>	-0.0663*	-0.0786*	-0.0670*	0.0813*	0.0455*	0.0503*	0.2413*	1									
<i>Lev</i>	0.2180*	0.2171*	0.2164*	0.0998*	0.3116*	0.4708*	-0.1626*	-0.1377*	1								
<i>Age</i>	0.1386*	0.1345*	0.1364*	0.0683*	0.4073*	0.3472*	-0.0950*	-0.0202*	0.3795*	1							
<i>Top1</i>	0.0680*	0.0561*	0.0673*	0.0669*	0.2110*	0.2136*	0.1228*	0.0874*	0.0533*	-0.0879*	1						
<i>MB</i>	0.1533*	0.1632*	0.1544*	-0.0748*	-0.1395*	-0.3958*	-0.0633*	0.0098	0.0188*	-0.0604*	-0.0782*	1					
<i>Balance</i>	-0.1020*	-0.0972*	-0.1004*	-0.0658*	-0.2844*	-0.1192*	-0.0005	-0.0294*	-0.1734*	-0.1732*	-0.6852*	0.0630*	1				
<i>Board</i>	-0.0139	-0.0215*	-0.015	0.1066*	0.2921*	0.2617*	0.0288*	0.0608*	0.1693*	0.1040*	0.0300*	-0.1062*	-0.0076	1			
<i>Dual</i>	-0.0354*	-0.0290*	-0.0344*	-0.0705*	-0.3001*	-0.1696*	0.012	-0.0275*	-0.1677*	-0.2194*	-0.0508*	0.0710*	0.0818*	-0.1805*	1		
<i>Independ</i>	0.0019	0.0034	0.0019	-0.0508*	-0.0789*	0.0206*	-0.0179*	-0.0289*	-0.0230*	-0.0271*	0.0376*	0.0309*	-0.0180*	-0.4514*	0.1074*	1	
<i>Big4</i>	-0.0288*	-0.0325*	-0.0299*	0.0344*	0.1412*	0.3559*	0.0604*	0.0825*	0.1037*	0.0668*	0.1388*	-0.1036*	-0.0395*	0.1173*	-0.0709*	0.0259*	1

Note: * indicates statistical significance at the 1% level.

overcapacity account for 21.7% of the total sample. For industries facing overcapacity, the average value of financial support from controlling shareholders is 0.668%, which is significantly higher than the 0.479% seen in non-overcapacity companies. The results show that, compared with companies in non-overcapacity industries, companies in overcapacity industries received more financial support from controlling shareholders. There are also other significant differences between companies in overcapacity industries and companies in non-overcapacity industries; the former are usually larger in scale and have poorer profitability, higher asset-liability ratios, older age, and lower business growth.

5.2. Correlation coefficient matrix

Table 3 presents the correlation coefficient test results. The results show that without controlling for other factors, there is a positive correlation between industry overcapacity and corporate financial support from controlling shareholders, which is significant at the 1% level.

Table 4
Overcapacity and financial support.

	All (1) <i>Prop</i> _{<i>t</i>+1}	SOE (2) <i>Prop</i> _{<i>t</i>+1}	Non-SOE (3) <i>Prop</i> _{<i>t</i>+1}
<i>Overcap</i>_{<i>t</i>}	0.145** (2.35)	0.433*** (3.40)	-0.049 (-1.04)
<i>Soe</i> _{<i>t</i>}	0.288*** (4.13)		
<i>Size</i> _{<i>t</i>}	-0.157*** (-4.81)	-0.225*** (-3.70)	-0.132*** (-4.19)
<i>Roe</i> _{<i>t</i>}	-0.749*** (-4.10)	-0.688** (-2.43)	-0.617*** (-2.72)
<i>Cash</i> _{<i>t</i>}	-0.900*** (-3.34)	-1.101** (-2.16)	-0.904*** (-3.15)
<i>Lev</i> _{<i>t</i>}	1.716*** (9.82)	2.270*** (6.78)	1.318*** (8.41)
<i>Age</i> _{<i>t</i>}	0.022*** (5.15)	0.024*** (3.25)	0.026*** (5.16)
<i>Top1</i> _{<i>t</i>}	1.261*** (4.49)	2.201*** (4.26)	0.513* (1.93)
<i>MB</i> _{<i>t</i>}	0.071*** (5.74)	0.091*** (3.14)	0.062*** (5.92)
<i>Balance</i> _{<i>t</i>}	0.065* (1.65)	0.167* (1.76)	-0.011 (-0.30)
<i>Board</i> _{<i>t</i>}	-0.049*** (-3.24)	-0.079*** (-3.33)	-0.009 (-0.56)
<i>Dual</i> _{<i>t</i>}	0.056 (1.30)	0.104 (0.78)	0.050 (1.23)
<i>Independ</i> _{<i>t</i>}	-0.298 (-0.66)	0.237 (0.26)	-0.206 (-0.47)
<i>Big4</i> _{<i>t</i>}	-0.208** (-2.56)	-0.187 (-1.45)	-0.177*** (-3.08)
<i>Cons</i>	2.522*** (3.97)	3.212*** (2.83)	2.399*** (3.63)
<i>Year</i>	Control	Control	Control
<i>Industry</i>	Control	Control	Control
N	27,180	10,969	16,211
Adj. R-sq	0.096	0.104	0.079
	Coefficient difference test (Chi2)		39.12***
	P Value		(0.000)

Note: The values in brackets are robust T values, and time series dependence is corrected by company-level clustering. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

5.3. Empirical analysis results

Table 4 presents the basic empirical results. Columns (1) to (3) show the results for the full sample, for state-owned enterprises, and for non-state-owned enterprises, respectively. As shown in column (1), for companies in an industry facing overcapacity, controlling shareholders provided more financial support, a finding that is significant at the 5% level. H1 was verified.

In industries with excess capacity, the pressure to clean up low-end production capacity and complete upgrading is particularly large for state-owned enterprises. Therefore, we examined whether the basic empirical results are still valid when controlling for the nature of property rights. The results in columns (2) and (3)

Table 5
Mechanism analysis: Financial status.

	All (1) <i>Prop_{t+1}</i>	SOE (2) <i>Prop_{t+1}</i>	Non-SOE (3) <i>Prop_{t+1}</i>
<i>Overcap_t</i>	0.193** (2.45)	0.502*** (3.33)	-0.079 (-1.31)
<i>Zscore_t</i>	-0.003 (-1.22)	-0.009 (-1.00)	-0.005** (-2.07)
<i>Overcap_t * Zscore_t</i>	-0.006* (-1.83)	-0.014 (-1.42)	0.003 (1.41)
<i>Soe_t</i>	0.289*** (4.14)		
<i>Size_t</i>	-0.155*** (-4.76)	-0.223*** (-3.67)	-0.127*** (-4.04)
<i>Roe_t</i>	-0.738*** (-4.05)	-0.644*** (-2.28)	-0.620*** (-2.73)
<i>Cash_t</i>	-0.902*** (-3.34)	-1.120*** (-2.19)	-0.880*** (-3.05)
<i>Lev_t</i>	1.567*** (7.47)	2.012*** (5.18)	1.153*** (6.10)
<i>Age_t</i>	0.022*** (5.14)	0.024*** (3.16)	0.025*** (5.15)
<i>Top1_t</i>	1.265*** (4.50)	2.190*** (4.24)	0.533** (2.00)
<i>MB_t</i>	0.076*** (5.35)	0.100*** (3.02)	0.067*** (5.86)
<i>Balance_t</i>	0.067* (1.71)	0.167* (1.76)	-0.009 (-0.23)
<i>Board_t</i>	-0.050*** (-3.28)	-0.079*** (-3.36)	-0.010 (-0.63)
<i>Dual_t</i>	0.058 (1.34)	0.100 (0.75)	0.051 (1.26)
<i>Independ_t</i>	-0.295 (-0.65)	0.237 (0.26)	-0.222 (-0.50)
<i>Big4_t</i>	-0.208** (-2.56)	-0.190 (-1.48)	-0.179*** (-3.12)
<i>Cons</i>	2.551*** (4.01)	3.321*** (2.95)	2.363*** (3.58)
<i>Year</i>	Control	Control	Control
<i>Industry</i>	Control	Control	Control
N	27,180	10,969	16,211
Adj. R-sq	0.096	0.104	0.079

Note: The values in brackets are robust T values, and time series dependence is corrected by company-level clustering. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

of Table 4 indicate that state-owned listed companies received more financial support from controlling shareholders. For non-state-owned enterprises, there is no similar discovery. Moreover, in between-group coefficient testing, this difference is significant at the 1% level. Thus, H2 was verified. State-owned enterprises in overcapacity industries can receive more financial support from controlling shareholders, possibly because they face more severe overcapacity problems, their business performance is more negatively affected, or they are under greater pressure to reduce capacity.

6. Further analysis

Why do controlling shareholders provide financial support to companies in industries with excess capacity? We analyzed the motivations from two perspectives: the starting point of support (i.e., corporate financial status) and the effect of support (i.e., the economic consequences).

6.1. Corporate financial status

Controlling shareholders are more likely to provide financial support to companies with poor financial status. Following Zheng et al. (2013), this study used the Z-score index (*Zscore*) to measure the financial status of a company. The larger the Z-score, the better the company's financial status. Table 5 presents the empirical results. The results show that, for an enterprise in an industry facing overcapacity, the worse the corporate financial situation, the more financial support provided by controlling shareholders. Thus, H3 was verified.

Table 6
Economic consequences.

	All (1) <i>Roa</i> _{<i>t</i>+1}	SOE (2) <i>Roa</i> _{<i>t</i>+1}	Non-SOE (3) <i>Roa</i> _{<i>t</i>+1}
<i>Prop</i> _{<i>t</i>}	−0.001*** (−2.65)	−0.001** (−2.36)	−0.000 (−0.96)
<i>Overcap</i> _{<i>t</i>}	−0.007*** (−4.13)	−0.015*** (−5.34)	−0.000 (−0.15)
<i>Prop</i>_{<i>t</i>} * <i>Overcap</i>_{<i>t</i>}	0.001** (2.24)	0.002*** (2.92)	0.002 (1.50)
<i>Size</i> _{<i>t</i>}	0.007*** (10.24)	0.007*** (7.96)	0.007*** (8.13)
<i>Lev</i> _{<i>t</i>}	−0.093*** (−25.49)	−0.097*** (−17.04)	−0.088*** (−17.97)
<i>Age</i> _{<i>t</i>}	−0.001*** (−5.93)	−0.000 (−1.43)	−0.001*** (−5.12)
<i>Board</i> _{<i>t</i>}	0.000 (0.85)	−0.000 (−0.36)	0.001** (2.32)
<i>Independ</i> _{<i>t</i>}	−0.031*** (−2.67)	−0.042*** (−2.73)	−0.008 (−0.49)
<i>Top1</i> _{<i>t</i>}	0.041*** (9.59)	0.024*** (3.79)	0.055*** (9.13)
<i>Cons</i>	−0.089*** (−6.61)	−0.097*** (−5.41)	−0.115*** (−5.73)
<i>Year</i>	Control	Control	Control
<i>Industry</i>	Control	Control	Control
N	27,180	10,969	16,211
Adj. R-sq	0.117	0.150	0.110

Note: The values in brackets are robust T values, and time series dependence was corrected by company-level clustering. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

6.2. Economic consequences

This study also explored the economic consequences of financial support from controlling shareholders, specifically whether such support enhanced the corporate value of listed companies. Following Huang et al. (2019), this study used return on assets (*Roa*) to measure corporate value. As shown in Table 6, the empirical results indicate that the financial support provided by controlling shareholders to enterprises facing overcapacity was conducive to improving operating performance. Thus, H4 was verified.

Based on this analysis, this study found that controlling shareholders provided financial support to enterprises facing overcapacity because of the nature of property rights and the financial status of the enterprise. Moreover, financial support from controlling shareholders enhanced the corporate value of enterprises.

6.3. Robustness checks

As the first robustness check, the financial support measurement method was adjusted. First, short-term financial support from controlling shareholders was considered. The specific formula is as follows: other

Table 7
Robustness analysis: Adjustment of financial support measurement method.

	(1) <i>Net_Prop</i> _{<i>t</i>+1}	(2) <i>Sh_Prop</i> _{<i>t</i>+1}
<i>Overcap</i> _{<i>t</i>}	0.147** (2.38)	0.113** (2.06)
<i>Soe</i> _{<i>t</i>}	0.292*** (4.19)	0.248*** (3.92)
<i>Size</i> _{<i>t</i>}	-0.159*** (-4.89)	-0.157*** (-5.56)
<i>Roe</i> _{<i>t</i>}	-0.706*** (-3.88)	-0.691*** (-4.05)
<i>Cash</i> _{<i>t</i>}	-0.890*** (-3.31)	-0.973*** (-4.02)
<i>Lev</i> _{<i>t</i>}	1.709*** (9.81)	1.587*** (9.99)
<i>Age</i> _{<i>t</i>}	0.021*** (4.97)	0.019*** (4.86)
<i>Top1</i> _{<i>t</i>}	1.261*** (4.50)	0.985*** (3.89)
<i>MB</i> _{<i>t</i>}	0.071*** (5.74)	0.066*** (5.80)
<i>Balance</i> _{<i>t</i>}	0.069* (1.76)	0.043 (1.19)
<i>Board</i> _{<i>t</i>}	-0.048*** (-3.21)	-0.042*** (-3.10)
<i>Dual</i> _{<i>t</i>}	0.055 (1.28)	0.056 (1.42)
<i>Independ</i> _{<i>t</i>}	-0.288 (-0.64)	-0.242 (-0.62)
<i>Big4</i> _{<i>t</i>}	-0.210*** (-2.60)	-0.160** (-2.38)
<i>Cons</i>	2.530*** (4.01)	2.673*** (4.88)
<i>Year</i>	Control	Control
<i>Industry</i>	Control	Control
<i>N</i>	27,180	27,180
<i>Adj. R-sq</i>	0.095	0.099

Note: The values in brackets are robust T values, and time series dependence was corrected by company-level clustering. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

payables to the parent company / total assets at the end of the period * 100%. Second, net support from controlling shareholders excluding the impact of tunneling was considered. The specific formula is as follows: (other payable to the parent company + long-term payable to the parent company – other receivables from the parent company-long-term receivables from the parent company) / period-end total assets * 100%. As shown in Table 7, the empirical results are largely consistent with the baseline results; controlling shareholders provided financial support to listed companies facing industry overcapacity crises. Thus, the empirical results are robust.

Second, Gopalan et al. (2007) found that when companies face bankruptcy risks, the internal capital market plays a propping role. Therefore, in consideration of the impact of extreme operating dilemmas, observations of companies receiving special treatment were excluded. As shown in Table 8, the empirical results remained largely unchanged; controlling shareholders provided financial support to listed companies facing industry overcapacity crises.

Finally, studies by Almeida et al. (2015) and Raffaele et al. (2020) found that macro-financial crises stimulate the propping role of internal capital markets. Therefore, in consideration of the impact of a deteriorating

Table 8
Robustness analysis: Excluding special-treatment companies.

	(1)	(2)	(3)
	<i>Prop_{t+1}</i>	<i>Net_Prop_{t+1}</i>	<i>Sh_Prop_{t+1}</i>
<i>Overcap_t</i>	0.142*** (2.66)	0.143*** (2.69)	0.108** (2.35)
<i>Soe_t</i>	0.251*** (4.15)	0.253*** (4.19)	0.218*** (4.01)
<i>Size_t</i>	-0.102*** (-3.62)	-0.106*** (-3.76)	-0.105*** (-4.45)
<i>Roe_t</i>	-0.962*** (-5.54)	-0.908*** (-5.25)	-0.878*** (-5.51)
<i>Cash_t</i>	-0.584** (-2.40)	-0.587** (-2.41)	-0.648*** (-2.98)
<i>Lev_t</i>	1.286*** (8.76)	1.283*** (8.78)	1.174*** (8.94)
<i>Age_t</i>	0.018*** (4.76)	0.017*** (4.64)	0.015*** (4.45)
<i>Top1_t</i>	1.140*** (4.28)	1.149*** (4.33)	0.885*** (3.71)
<i>MB_t</i>	0.052*** (5.11)	0.051*** (5.10)	0.047*** (5.17)
<i>Balance_t</i>	0.049 (1.35)	0.054 (1.49)	0.029 (0.88)
<i>Board_t</i>	-0.045*** (-3.16)	-0.044*** (-3.12)	-0.039*** (-3.08)
<i>Dual_t</i>	0.033 (0.94)	0.035 (1.00)	0.037 (1.14)
<i>Independ_t</i>	-0.277 (-0.68)	-0.257 (-0.64)	-0.225 (-0.66)
<i>Big4_t</i>	-0.259*** (-3.61)	-0.261*** (-3.67)	-0.211*** (-3.84)
<i>_cons</i>	1.591*** (2.96)	1.610*** (3.02)	1.781*** (4.02)
<i>Year</i>	Control	Control	Control
<i>Industry</i>	Control	Control	Control
N	26,053	26,053	26,053
Adj. R-sq	0.072	0.071	0.074

Note: The values in brackets are robust T values, and time series dependence was corrected by company-level clustering. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 9
Robustness analysis: Excluding observations during the financial crisis.

	(1)	(2)	(3)
	<i>Prop_{t+1}</i>	<i>Net_Prop_{t+1}</i>	<i>Sh_Prop_{t+1}</i>
<i>Overcap_t</i>	0.120** (2.05)	0.117** (2.01)	0.092* (1.82)
<i>Soe_t</i>	0.322*** (4.58)	0.325*** (4.63)	0.285*** (4.45)
<i>Size_t</i>	-0.124*** (-3.97)	-0.129*** (-4.14)	-0.127*** (-4.65)
<i>Roe_t</i>	-0.628*** (-2.95)	-0.597*** (-2.80)	-0.533*** (-2.71)
<i>Cash_t</i>	-1.102*** (-3.62)	-1.088*** (-3.58)	-1.138*** (-4.11)
<i>Lev_t</i>	1.583*** (9.48)	1.583*** (9.50)	1.469*** (9.57)
<i>Age_t</i>	0.018*** (4.47)	0.018*** (4.35)	0.016*** (4.25)
<i>Top1_t</i>	1.109*** (4.19)	1.123*** (4.25)	0.888*** (3.75)
<i>MB_t</i>	0.089*** (5.70)	0.089*** (5.67)	0.082*** (5.69)
<i>Balance_t</i>	0.061 (1.61)	0.066* (1.73)	0.046 (1.33)
<i>Board_t</i>	-0.053*** (-3.25)	-0.053*** (-3.22)	-0.046*** (-3.14)
<i>Dual_t</i>	0.037 (0.92)	0.037 (0.91)	0.035 (0.94)
<i>Independ_t</i>	-0.265 (-0.59)	-0.243 (-0.55)	-0.226 (-0.60)
<i>Big4_t</i>	-0.204** (-2.41)	-0.207** (-2.44)	-0.178** (-2.53)
<i>Cons</i>	1.949*** (3.05)	2.018*** (3.16)	2.126*** (3.83)
<i>Year</i>	Control	Control	Control
<i>Industry</i>	Control	Control	Control
N	20,400	20,400	20,400
Adj. R-sq	0.106	0.105	0.109

Note: The values in brackets are robust T values, and time series dependence was corrected by company-level clustering. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

external operating environment, observed values during financial crisis periods (i.e., 2008, 2009, and 2015) were excluded. As shown in Table 9, the empirical results remain largely unchanged; controlling shareholders provided financial support to listed companies facing industry overcapacity crises. Thus, the empirical results of this article are robust.

7. Conclusion

Cleaning up surplus low-end production capacity is an inevitable trend and a prerequisite for healthy market development. However, solving the problem of overcapacity requires a long-term approach. To survive this process, enterprises must improve their ability to withstand risks. By analyzing the data for China's A-share listed companies from 2007 to 2019, this study found that companies in industries with overcapacity received more financial support from controlling shareholders compared with those in non-overcapacity industries. Analysis of the mechanism revealed that state-owned enterprises and companies with relatively poor financial status receive more financial support from controlling shareholders. This study also examined the economic consequences of such support and found that it is conducive to enhancing business performance. The above findings withstood a series of robustness tests.

This study has several important implications. First, the allocation of resources in internal capital markets can help improve the risk resistance of enterprises facing overcapacity. Inferior companies are highly likely to withdraw from the market due to the normal function of the survival-of-the-fittest mechanism, but high-quality companies are also subject to the negative impacts of industry risks. As such, strengthening enterprises' risk buffers is an important prerequisite for survival. Second, internal capital markets serve a propping role for enterprises facing overcapacity, which is conducive to a smooth economic transition. Fierce market competition due to overcapacity is a normal economic phenomenon, but violent market fluctuations can harm the real economy. Maintaining relative market stability is an important foundation for a stable economic transition. Third, in supply-side reforms, coordination between government regulations and business operations is not the only type of government-market synergy: the cooperation of corporate stakeholders is also crucial in this regard.

This study also has some limitations. First, it does not explore how the propping role of internal capital markets affects the macroeconomy, whether positively or negatively. Does controlling shareholders' provision of financial support to enterprises facing overcapacity promote or inhibit the process of cleaning up excess capacity? Second, this article analyzes the microeconomic consequences of overcapacity in terms of controlling shareholders' provision of financial support, but does not examine other important behaviors (e.g., of controlling shareholders and management) related to investment, financing, and strategy. Third, this study adopts a somewhat broad and unfocused research context; different industries have different overcapacity situations, and processes of reducing capacity may also vary. Such differences should lead to different effects on enterprises. This article does not focus on differences among overcapacity industries, but rather analyzes differences in controlling shareholder behavior between overcapacity industries and non-overcapacity industries. As such, the findings may have limited interpretability and applicability to real-world problems. These issues require further investigation in future research.

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