Mixed-ownership reform and deleveraging of state-owned enterprises: Degree and methods

Yulan Wang\textsuperscript{a}, Xiaochen Dou\textsuperscript{b} and Zhiyi Liu\textsuperscript{a}

\textsuperscript{a}School of Accountancy, Shanghai University of International Business and Economics, Shanghai, China; \textsuperscript{b}Chinese Academy of Fiscal Sciences, Beijing, China

**ABSTRACT**

Based on data of state-owned enterprises listed on the Shanghai and Shenzhen Stock Exchange from 2007 to 2018, this study examines how mixed-ownership reform affects the deleveraging behaviour of state-owned enterprises (hereafter, SOEs). We find that the higher the degree of equity balance between state-owned shareholders and non-state-owned shareholders of SOEs, the more inclined they are to choose to deleverage. As for the methods of deleveraging, they are more inclined to choose retained earnings and current debt repayment in the deleveraging process. Furthermore, this effect is more pronounced for SOEs with excess leverage, in low marketisation regions and pronounced for both centre SOEs and local SOEs. We also find that mixed-ownership reform increases deleveraging SOEs’ operating performance. The results suggest that mixed-ownership reform can efficiently promote the deleveraging behaviour of SOEs in positive ways.

**KEYWORDS**

Mixed-ownership reform; equity balance; degree of deleveraging; methods of deleveraging

1. Introduction

Since China's reform and opening up, the economic and social performances of SOEs have increased significantly (Bai et al., 2006). But with the high speed of economic growth, many institutional and structural contradictions have also accumulated, which now are gradually transferring into different types of risks, especially the risks of debt default and bad debt increasing due to the excess leverage of non-financial firms. X.J. Zhang et al. (2019) find that as with the level of leverage, the ratio of total debt to GDP reached 250% in 2018, which is close to that of the United States, but much higher than the average leverage ratio of 190% in developing economies. In terms of speed, from 2008 to 2016, China’s leverage ratio rose by an average of 12 percentage points per year, almost twice the speed at which the global leverage ratio increased during the same period. After considering the main structure of leverage, it is found that SOEs accounted for almost 60% debt of non-financial corporates. Therefore, in November 2015, the Chinese authorities initialised a deleveraging policy for non-financial corporates, requiring the removal of excess leverage of non-financial enterprises, especially SOEs.
Existing research has primarily examined the influencing factors of deleveraging from the perspectives of financial marketisation (Jin et al., 2017), tax policies (Shen et al., 2018), liberalisation of trade (Jiang & Lu, 2018), interest rate marketisation reform (Zheng & Li, 2018), fiscal decentralisation (Tan & Zhang, 2021), monetary policy (Jia et al., 2021), innovation (Yu, 2017), firm growth and leverage level (Xu et al., 2020). However, the relationship between corporate governance and deleveraging has seldom been studied, and research into deleveraging methods is rarer still. For many years, the topic of government intervention – derived from the multiple goals of SOEs and the agency conflict of owner absence – has received extensive scholarly attention (Laffont & Tirole, 1993; Shleifer & Vishny, 1994). As an important solution to the problem of SOEs in the new era, SOEs’ mixed-ownership reform has also become a focus of academic research. Prior research notes that the key to deleveraging of SOEs is to reduce the resource advantage inherent in state-owned capital to a certain extent, strengthening the financial constraints faced by SOEs and giving full play to the market in reallocation of credit resources (Megginson et al., 2014). However, prior researches find that the impact of forbidden deleveraging policy is not obvious; instead, some firm’s debt level increased through leverage manipulation (X. F. Xu & Lu, 2020). Thus, some scholars suggest that deleveraging should be done through SOE mixed-ownership reform (Li et al., 2020; Tan & Zhang, 2021).

The third Plenary Session of the 18th Central Committee of the Communist Party of China passed the “decision of the Central Committee of the Communist Party of China on several issues concerning deepening the reform’, which proposed to establish an efficient corporate governance system, promoting SOEs’ mixed-ownership reform, establishing a modern corporate system that meets the requirements of a market economy, making SOEs bigger and stronger, strengthening the efficiency, influencing and risk-controlling abilities of SOEs. The entry of non-state-owned shareholders can form a more reasonable balance of multiple ownership structures (Y.H. Hao & Wang, 2015). Moreover, by participating in corporate governance, non-state-owned shareholders can influence the operating and governance decisions of SOEs to give full play to the monitoring and governance roles of private capital (Cai, Zhang, et al., 2018). Additionally, mixed-ownership reform can reduce the policy burden of SOEs, thus reducing their inherent resource advantage and weakening the soft budget constraints. This will enhance the competition and risk-controlling ability of SOEs (Bai et al., 2006). Can SOEs’ mixed-ownership reform promote the deleveraging of SOEs? Specifically, which methods should SOEs choose in deleveraging – share equity increasing or debt decreasing? Or both? Has SOEs’ operating performance improved after deleveraging? This paper tries to answer these questions using empirical studies.

This paper examines whether, and how, mixed-ownership reform can affect the deleveraging degree and methods based on data of listed SOEs from 2007 to 2018. To quantify the mixed-ownership reform of listed SOEs from the dimension of ownership structure, we manually collect data on companies’ top 10 shareholders and shareholding ratio, which are disclosed in annual reports. Our research indicates that the higher the degree of equity balance between state-owned shareholders and non-state-owned shareholders, the higher the degree of deleveraging in SOEs. Moreover, mixed ownership promotes the deleveraging of SOEs through the methods of earnings retention and short debt reduction. Furthermore, the positive impact of mixed-ownership reform on
deleveraging is more pronounced for SOEs with excess leverage, in low marketisation regions – a positive impact significant both for central and local SOEs. Meanwhile, we observe that SOEs’ operating performance has improved after deleveraging, which indicates that mixed-ownership reform can exert a positive effect on SOEs’ performance.

Compared with previous literature, the contributions of this article are as follows. First, existing research on the economic consequences of mixed-ownership reform in SOEs has mainly focused on the macro-economy, operating efficiency, corporate governance and financial decisions. Moreover, previous literature has not studied if, or whether, any mixed-ownership reform of SOEs affects deleveraging degree and methods. Therefore, this study enriches the existing literature on the mixed-ownership reform of SOEs. Second, this article enriches the existing literature on deleveraging. Prior research on deleveraging has mostly focused on the external institutional environment, monetary policy and fiscal policy. Existing research has mainly studied the degree of deleveraging but has not studied methods of deleveraging. This article studies the impact of SOE ownership reform on deleveraging from the perspective of degree and methods, and enriches the existing literature on deleveraging. Finally, this research also has certain policy implications. Notably, our research finds that SOEs’ mixed-ownership reform has a positive impact on the deleveraging behaviour of SOEs, and it can promote SOEs to implement deleveraging through a positive and sustainable way, supporting the economic policy of mixed-ownership reform implemented by the Chinese government and providing relevant information for the further reform of SOEs.

The structure of the present article is as follows: The second section introduces the institutional background of SOE reform and the forbidden deleveraging policy in China, and develops a hypothesis based on a literature review. The third section outlines the sample, data, research design and model. The fourth section reports the results of empirical tests. The fifth section is further analysis, examining how the mixed-ownership reform of SOEs affects deleveraging in different situations. The sixth section examines the economic consequences of deleveraging. To verify our conclusions, the seventh section introduces several robustness tests. The final section of this article presents the conclusions.

2. **Institutional background, literature review and hypothesis development**

2.1. **Institutional background**

2.1.1. **Deleveraging of state-owned enterprise**

In 2015, the Chinese government put forward their supply-side policy, and one of its core elements required Chinese firms to reduce their level of debt. The rapid accumulation of Chinese non-financial corporate debts has several root causes. The first direct cause is the 2009–2011 stimulus programme (mainly in the form of banking credit) launched by the Chinese authorities to mitigate the shock from the Global Financial Crisis. The second fundamental causes are China’s financial repression and its banking-centric financing model. China’s financial system can be characterised by financial repression (G. Xu & Gui, 2013). The Chinese government’s main policy instruments include the monopoly status of state banks in the financial sector, the managed credit allocation, and the very low level of interest rates. Regarding the stock market, as argued by Liu (2020), Chinese
domestic stock markets were mainly vehicles for equity financing to help SOEs. Frequent government intervention has caused serious damage to Chinese stock markets by endangering their integrity and voiding their basic principles of functioning, namely, risk transfer and price discovery. As a result, equity financing only accounts for around 2.9% of China’s total social financing in stock.

According to prior research, the high leverage of non-financial corporates contributed most to the high leverage of China (X.J. Zhang et al., 2019). Furthermore, the high leverage of non-financial corporates was mainly driven by the high leverage of SOEs (Wang, Dou, et al., 2019). X.J. Zhang et al. (2019) suggests that SOE’s leveraging has been driven by institutional factors amid generally lower funding costs than their private counterparts. SOEs, which have been burdened with social responsibility, have strong incentives to borrow. Their objective is not necessarily to maximise profit but in many cases to realise social welfare aims such as maintaining GDP growth and labour market stability. As large banks are also mainly state owned, they are supposed to share some of this social responsibility. As a result, banks may have been skewed towards SOEs out of policy priority and implicit guarantees by the government. Correspondingly, in view of the emergency and significance of SOEs’ debt issue, the Chinese authorities have adopted a combination of approaches, including improvement of corporate governance, state-owned assets’ supervision reform, mixed-ownership reform and a corporate deleveraging strategy.

2.1.2. State-owned enterprise reform

SOE reform has always been at the core of China’s economic system reform and has constantly been explored and practiced. China’s SOE reform has roughly experienced the following four stages.

The first stage (1978–1992) was the ice-breaking period that involved the preliminary exploration of delegating power and transferring profits. The Third Plenary Session of the Eleventh Central Committee noted that one defect of China’s economic system was concentrated power. Instead of outright privatisation, China concentrated first on productivity improvement by initiating enterprise governance structures that stressed autonomy and better incentives and then later by adopting long-term managerial contracts with pre-specified financial targets (such as profits and tax). Instead of introducing markets and liberalising prices overnight, China first created markets at the margin, parallel to the planned economy, by introducing the ‘dual-track system’ in the state industrial sector and by lowering bureaucratic barriers to entry to the once state-monopolised industries. The marginal productivity of labour increased by 54% and the growth in total factor productivity was 4.68–6% per year during 1980–1989 (Groves et al., 1994; Li, 1997).

The second stage (1993–2003) was the ‘institution innovation’ development period. Since the reforms began, despite significant output expansion and productivity gains, the profitability of the SOEs declined substantially and most of them were losing money in the early 1990s. As a result, many SOEs were deeply in debt and, by 1994, close to half of the SOEs had zero or negative equity. The decline in profitability was due to two reasons. First, without a clear allocation of property rights, the SOEs’ obligations were on the profit side but not on the loss side, which reduced their incentives to improve their operating efficiencies. Second, SOEs operated under
unfavourable conditions due to their many social responsibilities. Thus, in November 1993, the Third Plenary Session of the Fourteenth Central Committee of the Communist Party of China passed the ‘Decision of the Central Committee of the Communist Party of China on Several Issues Concerning the Establishment of a Socialist Market Economic System’, which proposed that the direction of China’s SOE reform should aim to establish a modern corporate system that met the requirements of a market economy and socialised mass production, with clear property rights, specific rights and responsibilities, separation of government and enterprises, and scientific management. At this time, market and legal institutional conditions for privatisation were partially in place: both product and labour markets were developed.

The third stage (2004–2013) was a period of ‘in-depth advancement’ dedicated to promoting SOE reform through asset management system reform to realise the preservation and appreciation of state-owned assets, and solve the problem of inefficient management and regulation of state-owned economy. By the end of 2004, 62.8% of the SOEs and COEs were privatised and 92,493 firms had been privatised with total assets of 11.4 trillion RMB (Gan & Xu, 2008). The main task of this period was deepening the reform of SOEs; it required the central and provincial, municipal and autonomous region governments to establish specialised state-owned asset management institutions.

The fourth stage (2014 to present) represented the ‘struggling deepening’ stage of SOE reform. This stage has involved initiating a pilot program for the formation of state-owned capital investment and operating companies. In 2017, the State-owned Assets Supervision and Administration Commission of the State Council created four batches of mixed-ownership reform pilot enterprises. The mixed-ownership reform is mainly in three forms: non-state-owned capital can invest in SOEs; state-owned capital can invest in non-SOEs; implementation of employee stock ownership plan.

### 2.2. Literature review

#### 2.2.1. Mixed-ownership reform

Mixed-ownership reform is not only a major subject of existing research on the consequences of China’s current economic reforms but also provides urgent practical research related to micro-enterprises operating in this new phase. Existing research on the economic consequence of mixed-ownership reform has mainly focused at the micro-enterprise and macro-economic levels. Research on economic consequence at the micro-enterprise level has mainly studied the impact of mixed-ownership reform on the operating efficiency, corporate governance and financial decisions of SOEs. Y. Hao and Gong (2017) find that SOEs’ mixed-ownership reform can improve the management’s pay for performance, sensitivity of turnover and performance pressure, which improves the performance of SOEs. Ma et al. (2020) suggest that mixed-ownership reform can improve the performance of SOEs through encouraging non-state-owned shareholders to participate in the corporate governance of SOEs, which will optimise the incentive mechanism of employees, lower the over-hiring of SOEs and improve operating efficiency. Yi et al. (2021) find that mixed-ownership reform can significantly improve the efficiency of employees and reduce the over-hiring of SOEs, which bring a positive effect for the firm’s total factor productivity (TFP). Except for operating performance, prior literature has also examined the impact of mixed-
ownership reform on SOEs’ financial decisions. Yang et al. (2020) note that mixed-ownership reform has a positive effect on investment efficiency with regard to diversified investment, and this positive effect is more pronounced in high marketisation regions. Chen et al. (2019) demonstrate that state-owned capital can promote the innovation of large SOEs, but non-state-owned capital can promote the innovation of small SOEs, which supports ‘size the large, release the small’ in mixed-ownership reform. Some research have also examined the effect of mixed-ownership reform on financial investment. Ye and Li (2021) find that the entrance of non-state-owned shareholders is positive for the level of financial assets’ investment of SOEs and point out that it is an incentive for saving but not for speculating. Research on mixed-ownership reform and the financing behaviour of SOEs has been rare; Wu and Du (2019) find that mixed-ownership reform can reduce the excess leverage of SOEs through reducing their policy burden. Chen and Qian (2021) show that mixed-ownership reform can reduce the leverage ratio of SOEs through the governance of non-state-owned shareholders.

2.2.2. Deleveraging behaviour
Existing research has explored the factors influencing the deleveraging of enterprises from an internal and external dimension. For example, Yu (2017) find that innovation can promote the deleveraging of enterprises, as it can improve the competition among products. Jiang and Lu (2018) suggest that the disposal of ‘zombie enterprises’ is significantly positive with deleveraging. Xu et al. (2020) demonstrate that firms with excess leverage are more likely to deleverage. Zhuang et al. (2022) show that improving the cost of default can significantly promote deleveraging of companies. Han et al. (2020) study deleveraging from the relationship between different financial policies, and find that forbidden dividend payments are not beneficial to deleveraging, but different dividend payment policies can reduce the demand for debt, which is beneficial to deleveraging.

Compared with internal factors, most studies have focused on the external factors that influence deleveraging. Zheng and Li (2018) find that the marketisation of interest rates can significantly promote the deleveraging of companies, and this effect is more pronounced for non-SOEs and firms in high industry concentration. Li et al. (2020) highlight that financial marketisation can increase the leverage of firms with high profitability, but decrease the leverage of low profitability firms, which can help to realise the goal of structural deleveraging. Additionally, J.Q. Zhang et al. (2022) find that Bank Fin-Tech can promote the structural deleveraging of firms by enhancing bank’s information screening ability and optimising their risk management model. Jiang et al. (2019) suggest that the liberalisation of trade can enhance profitability and accelerate the exiting of ‘zombie firms’, which is beneficial to firms’ deleveraging. Moreover, some research has suggested deleveraging through monetary and fiscal policy. For example, Tan and Zhang (2021) show that fiscal decentralisation is significantly related to the divergence of the corporate leverage ratio. The greater the degree of decentralisation of local fiscal expenditures, the higher the leverage ratio of SOEs and the lower the leverage ratio of non-SOEs. C.S. Zhang et al. (2021) demonstrate that increasing the number of nominal currencies cannot solve the leverage problem caused by the lack of value support for liquidity. Only by increasing the number of reserve assets corresponding to the issued currency to inject additional value support of liquidity can the liquidity shortage dilemma be solved. Liu et al. (2020)
highlight that China’s financial structure, dominated by indirect financing, is often considered to be the main reason for the high leverage ratio, so reducing the proportion of indirect financing is seen as an effective means of deleveraging.

Based on the literature review, most existing research on the economic consequences of SOEs' mixed-ownership reform has focused on macroeconomics perspective, operating efficiency, corporate governance and financial decisions. To date, no studies have investigated whether, or how, mixed-ownership reform of SOEs affects the deleveraging behaviour of companies. Previous studies on the deleveraging of Chinese firms have not analysed the perspective of mixed-ownership reform of SOEs, which is an important economic policy in China and will significantly affect their operation. Moreover, existing research on deleveraging has mainly focused on the degree of deleveraging, but focused less on the methods of deleveraging. Therefore, it is of theoretical and practical significance to explore whether and how mixed-ownership reform affects the deleveraging of SOEs.

2.3. Hypothesis development

Berle and Means (1932) note that the agency problem between shareholders and management under diverse ownership is an important feature of modern enterprises. The conflicts between shareholders and management lead to management’s on-the-job consumption, empire-building and other behaviours that damage shareholder’s value. Thus, shareholders have incentives to better monitor a company’s management by efficient monitoring and incentive mechanisms. However, for SOEs, there may be some differences. Vickers and Yarrow (1991) note that private shareholders have incomparable monitoring advantages over public shareholders. Unlike shareholders of private enterprises, the government also has agency issues that cause multiple agency problems between the government and SOEs. It is difficult to achieve monitoring, and there is an obvious owner absence problem in SOEs. Therefore, due to the ‘insider control’ problem caused by the dominant shareholding and the absence of owners, SOEs’ efficiency and governance mechanism are lower than non-SOEs’. Moreover, within the context of Chinese special institutions, SOEs have typical ‘half-enterprise and half-government’ characteristics, which makes them subject to multiple strategic tasks (Lin & Tan, 1999). State-owned banks will give SOEs more preferential treatment when making credit decisions, and SOEs also receive financial support from the government. Thus, SOEs' low operating efficiency and its priority of credit resources results in excess leverage.

In the mixed-ownership reform of SOEs, on the one hand, the entry of non-state-owned shareholders can form a more reasonable balance of multiple ownership structures (Y.H. Hao & Wang, 2015). On the other hand, non-state-owned shareholders can participate in corporate governance and influence corporate decision-making. Meanwhile, non-state-owned shareholders pursue the maximisation of their own interests, have strong motivation to monitor the behaviour of company management, and solve the absence of owners and ‘insider control’ issues in SOEs to a certain extent while improving the corporate governance of SOEs. Financing plays a critical role in a company’s operating activities: a higher leverage ratio will increase a firm’s financial risk, even taking the problem of insolvency and distress into account. Thus, non-state-owned shareholders will pay much attention to financial risks of SOEs because they will
bear the consequences of insolvency, which will result in the deleveraging of SOEs. Additionally, with the introduction of non-state-owned capital and the reduction of state-owned shareholding in mixed-ownership reform, the policy burden of SOEs will decrease, which will reduce the resource advantages associated with state-owned capital to a certain extent and strengthen the financial constraints faced by enterprises (Megginson et al., 2014). These may reduce the leverage ratio of SOEs, increasing the probability of deleveraging. The entrance of non-state-owned shareholders can also enhance the operating performance of SOEs, which will increase internal capital and reduce reliance on debt. This can also promote the deleveraging of SOEs.

Based on the analysis of non-state-owned shareholder monitoring and deleveraging of SOEs after mixed-ownership reform, we propose research Hypothesis 1.

**Hypothesis 1**: The higher the degree of SOE mixed-ownership reform is, the higher the degree of deleveraging in SOEs.

Research on the adjustment of capital structure has mainly focused on the speed of adjustment but has seldom studied the methods of adjustments. DeAngelo et al. (2018) find that earnings retention makes a non-trivial contribution to the typical deleveraging episode, and debt repayment is generally much more important than retention when firms deleverage to a conservative capital structure. Zhou et al. (2020) try to figure out whether enterprises deleverage in a more positive and conservative way, and what factors influence their choice of deleveraging methods. They find that there are significant differences in the choice of deleveraging methods among Chinese listed companies. The choice of deleveraging method is significantly affected by the degree of over-indebtedness, growth and corporate governance. Enterprises with more excessive debt and investment opportunities are more likely to deleverage by ‘increasing equity’, which is a more positive way of deleveraging. Enterprises with weak governance are more likely to deleverage by ‘increasing other equity’ and ‘decreasing short-term debt’, which are less conservative ways of deleveraging. The introduction of non-state-owned capital may increase the share equity of SOEs, which may lead to a decrease in the debt ratio. However, based on the analysis above, the entrance of non-state-owned shareholders in corporate governance will improve the operating efficiency of SOEs, and this may lead to the increasing of earnings retention and realise the goal of deleveraging. Additionally, improving operating performance will also bring more free cash flows, and will enhance SOEs’ solvency, encouraging SOEs’ deleveraging through debt repayment. In order to figure out the impact of SOEs’ mixed-ownership reform on the methods of deleveraging that SOEs choose, this paper divides deleveraging methods according to the following criteria.

X. F. Xu and Lu (2020) suggest that the methods of deleveraging for enterprises can be divided into two main categories. One is to reduce the total amount of liabilities by repaying debts (referred to as ‘decreasing debt’). The other is to increase the total amount of equity (referred to as ‘increasing equity’) by issuing new shares, increasing retained earnings or other ways of increasing equity. The owner’s equity increase by issuing new shares (referred to as ‘increasing capital’) includes the newly increased capital stock and the corresponding capital premium. The owner’s equity increase by increasing retained earnings (referred to as ‘increasing retained earnings’) includes the increased surplus...
reserve and undistributed profits. Increasing capital and increasing retained earnings are collectively referred to as ‘increasing capital and retained earnings’. ‘Increasing other equity’ means increasing equity through accounting methods, mainly including value changes in the fair value of assets and long-term equity investment accounted by the equity method. ‘Decreasing debt’ includes reducing long-term and short-term debt, which are referred to as ‘decreasing long-term debt’ and ‘decreasing short-term debt’, respectively.

Based on the analysis of SOEs’ mixed-ownership reform and the methods of deleveraging, we propose research Hypothesis 2.

**Hypothesis 2a:** The higher the degree of SOEs’ mixed-ownership reform, the more likely SOEs are to deleverage through increasing equity.

**Hypothesis 2b:** The higher the degree of SOEs’ mixed-ownership reform, the more likely SOEs are to deleverage through decreasing debt.

### 3. Research design

#### 3.1. Sample and data

Since 2007, listed companies began to implement the new ‘Accounting Standards’ and most companies have finished the Split-Share Structure Reform, and these reforms may have some effect on the financing behaviour of SOEs. Therefore, this paper selects 2007–2018 as the sample period. Since this study examines the economic consequence of SOE mixed-ownership reform, we use listed SOEs as our initial sample. On this basis, we screen the samples according to the following criteria: (1) Excluding samples in the financial industry; (2) Excluding ST and PT samples and (3) Excluding samples whose leverage ratio is above one and under zero; (4) Excluding samples with missing data. Ultimately, we obtain a total of 7858 firm–year observations.

Basic data on the ownership structure dimension of SOEs undergoing mixed-ownership reform is derived from the top 10 shareholders disclosed in each company’s annual report. We collect companies’ periodic reports and official websites to determine the nature and shareholding ratio of the top 10 shareholders of each company. Other financial data are obtained from the CSMAR database. To mitigate the effect of potential outliers, we winsorise all continuous variables at both the upper and lower 1 percentile.

#### 3.2. Variable definitions and research model

##### 3.2.1. Measures of deleveraging

This study examines SOEs deleveraging behaviour from the dimensions of deleveraging degree and deleveraging method. Following prior studies (DeAngelo et al., 2018; Xu et al., 2020; Zhou et al., 2020), we construct the deleveraging degree variable $DLEV$, which is equal to the book leverage ratio at the end of year $t$ minus that at the end of year $t-1$ and then divide by the leverage ratio at the end of year $t-1$. Lower and negative $DLEV$ suggests a higher degree of deleveraging. On the other hand, this paper also measures
deleveraging behaviour from the dimension of deleveraging methods. Following Zhou et al. (2020), this paper divides the deleveraging methods into reducing debt (ΔDebt) and increasing equity (ΔEquity). ΔDebt equals the total debt at the end of year t minus that at the end of year t-1 and then divided by total debt at the end of year t-1. Lower and negative Δdebt suggests SOEs are more inclined to choose decreasing debt than deleveraging. Additionally, we divide reducing debt into reducing short debt (ΔShort) and reducing long debt (ΔLong). ΔShort equals the current debt at the end of year t minus that at the end of year t-1 and then divided by current debt at the end of year t-1. ΔLong equals to non-current debt at the end of year t minus that at the end of year t-1 and then divided by non-current debt at the end of year t-1. As for equity reducing, we use the change ratio of equity to measure it. ΔEquity equals to total equity at the end of year t minus that at the end of year t-1 and then divided by total equity at the end of year t-1. Higher and positive ΔEquity suggests SOEs are more inclined to choose increasing equity to deleveraging. We further divide increasing equity into shares issue plus earnings retention (ΔE_Retain) and increasing other comprehensive income (ΔE_Other). ΔE_Retain equals to the sum of capital (including share capital and share premium) and retained earnings at the end of year t minus that at the end of year t-1 and then divided by the sum of capital and retained earnings at the end of year t-1. ΔE_Other equals to other comprehensive income at the end of year t minus that at the end of year t-1 and then divided by other comprehensive income at the end of year t-1. Considering the direct effect of mixed-ownership reform on equity, we further divide equity increasing into shares issue (ΔE_Capital) and earnings retention (ΔE_Earnings). ΔE_Capital equals to capital (including share capital and share premium) at the end of year t minus that at the end of year t-1 and then divided by capital at the end of year t-1. ΔE_Earnings equals to retained earnings at the end of year t minus that at the end of year t-1 and then divided by retained earnings at the end of year t-1.

3.2.2. Independent and control variables
Following Yang and Yin (2018), we measure the mixed-ownership reform of SOEs from the equity balance dimension (Mixrate) as the relative value of the shareholding ratio of state-owned shareholders (Es) and shareholding ratio of non-state-owned shareholders (Ep). We choose the max of state-owned shareholders’ shareholding ratio and non-state-owned shareholders’ shareholding ratio as the denominator to ensure that Mixrate is between 0 and 1. Mixrate = min{Ep,Es}/Max{Ep,Es}. The larger the value of Mixrate, the higher the shareholding ratio of non-SOE shareholders.\(^1\)

Following prior studies (DeAngelo et al., 2018; Lu et al., 2015; Xu et al., 2020; Zhou et al., 2020), the following control variables are selected for the analysis: company characteristic variables such as firm size (SIZE), return on total asset (ROA), sales growth (GROWTH), industry year median leverage ratio (IND_LEVB), proportion of tangible assets (FATA), non-debt tax shield (NDTS), ratio of overheads expenses (EXP), effective tax ratio (ETR), top

\(^1\)Suppose there are two mixed-ownership reform SOEs, whose equity balance ratios are Mixrate1 and Mixrate2, respectively, and Mixrate1 < Mixrate2. The shareholding ratio of non-state-owned shareholders in SOE1 is N1, the shareholding ratio of state-owned shareholders is S1 and Mixrate1 = N1/S1(N1 < S1). In the same way, Mixrate2 = N2/S2(N2 < S2). According to the above assumption, N1/S1 < N2/S2, if N1 > N2, then S1 < S2. And we can get the following conclusions that: N1 < S1 ① N2 < S2 ② N1 > N2 ③ S1 < S2 ④. According to ① and ②, we can get the conclusion that S1-S2 < 0, and N1-N2 < 0, N1 < N2. But this contradicts ④, so N1 < N2 cannot be established. So the larger the value of Mixrate, the higher the shareholding ratio of non-state-owned shareholders in SOEs.
Table 1. Variables definition.

| Variable       | Definition                                                                                                                                 |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| **Dependent variables** |                                                                                                                                 |
| DLEV           | degree dimension of deleveraging, calculated as book leverage ratio at the end of year t minus those at the end of year t-1 and then divided by leverage ratio at the end of year t-1. |
| ΔDebt          | methods dimension of deleveraging, calculated as total debt at the end of year t minus those at the end of year t-1 and then divided by total debt at the end of year t-1. |
| ΔEquity        | methods dimension of deleveraging, calculated as total equity at the end of year t minus those at the end of year t-1 and then divided by total equity at the end of year t-1. |
| ΔShort         | methods dimension of deleveraging, calculated as current debt at the end of year t minus those at the end of year t-1 and then divided by current debt at the end of year t-1. |
| ΔLong          | methods dimension of deleveraging, calculated as non-current debt at the end of year t minus those at the end of year t-1 and then divided by non-current debt at the end of year t-1. |
| ΔE_RETAIN      | methods dimension of deleveraging, calculated as the sum of capital (including share capital and share premium) and retained earnings at the end of year t minus those at the end of year t-1 and then divided by capital and retained earnings at the end of year t-1. |
| ΔE_Capital     | methods dimension of deleveraging, calculated as capital (including share capital and share premium) at the end of year t minus those at the end of year t-1 and then divided by capital at the end of year t-1. |
| ΔE_Earnings    | methods dimension of deleveraging, calculated as retained earnings at the end of year t minus those at the end of year t-1 and then divided by retained earnings at the end of year t-1. |
| ΔE_Other       | methods dimension of deleveraging, calculated as other comprehensive income at the end of year t minus those at the end of year t-1 and then divided by other comprehensive income at the end of year t-1. |
| **Independent variables** |                                                                                                                                 |
| Mixrate        | Measure of mixed-ownership reform, defined as the relative value of the shareholding ratio between state-owned shareholders (Es) and non-state-owned shareholders (Ep), Mixrate = min[Ep, Es]/Max(Ep, Es). |
| **Other variables** |                                                                                                                                 |
| SIZE           | Firm size, defined as the natural logarithm of the firm’s total assets.                                                                  |
| ROA            | Return on assets, defined as the firm’s net income divided by total assets.                                                             |
| GROWTH         | Sales growth, defined as the annual growth of the firm’s sales.                                                                      |
| FATA           | Defined as total fixed assets to total assets                                                                                            |
| SHRCR1         | Top shareholding, defined as the proportion of shares held by the firm’s largest shareholder.                                            |
| NDT5           | Non-debt tax shield, it equals to the interest expense to total assets.                                                                  |
| EXP            | Defined as overhead expenses to total assets                                                                                            |
| ETR            | Effective tax rate ratio, defined as the total tax paid to total assets.                                                                |
| IND_LEVB       | Industry year median leverage.                                                                                                         |
| Vebitta        | Standard deviation of cash flow.                                                                                                        |
| Vcota          | Standard deviation of EBIT.                                                                                                             |
| Manhold        | Ratio of shares held by top management.                                                                                                 |
| MB             | Market value/replacement value.                                                                                                         |
| Industry       | Industry dummy, industries are based on the CSRC’s one-digit industry code for non-manufacturing firms and two-digit industry code for manufacturing firms. |
| Year           | Year dummy, set dummy variable for the year corresponding to the observation.                                                          |

Table 1. Variables definition.

shareholding (SHRCR1), management shareholding (Manhold), market-to-book ratio (MB), standard deviation of cash flow (Vcota) and standard deviation of EBIT (Vebitta). Additionally, the regression also controls for industry (INDUSTRY) and year (YEAR) fixed effects. To eliminate the influence of the company clustering effect, the research clusters standard errors at the firm level and adjusts for robust standard errors. See Table 1 for detailed definitions of the variables used in the regression.

3.3. Regression model

The following model is constructed to test Hypothesis 1 and Hypothesis 2.
\[ DLEV_{i,t}/\Delta Debt_{i,t}/\Delta Equity_{i,t} = \beta_0 + \beta_1 Mixrate_{i,t} + \beta_2 Controls_{i,t} + \Sigma INDUSTRY + \Sigma YEAR + \varepsilon \]  \tag{1}

The dependent variables denote the degree and methods of deleveraging. The independent variable Mixrate denotes the equity balance between state-owned shareholders and non-state-owned shareholders in SOEs. The control variables are described in section 3.2.2.

4. Empirical results

4.1. Summary statistics

Table 2 provides the summary statistics for the main variables. The average value of DLEV is 6.2%, indicating that most SOEs increased their leverage during the research period. The number of SOEs that choose to deleverage is under the half of the whole sample. The average value of LEV is 45.7%, which seems not too high. As for the methods of deleveraging, the mean value of \( \Delta Debt \) is 17.4%, indicating an increase in debt. The mean values of \( \Delta Short \) and \( \Delta Long \) are both positive, indicating an increase in short and long debt. The average value of \( \Delta Equity \) is 16.7%, indicating that SOEs increased their equity during the study period. \( \Delta E_{\text{Retain}} \) has a mean value of 17.2%, \( \Delta E_{\text{Other}} \) has a mean value of 34.4%. The explanatory variable, the equity balance between state-owned shareholders and non-state-owned shareholders of SOEs’ mixed-ownership reform (Mixrate) has a mean value of 22.8%, indicating that the equity balance of mixed-ownership reform SOEs is not high, the shareholding ratio of non-state-owned shareholders seems a bit lower; this result is consistent with previous studies about China’s mixed-ownership reform (Ma et al., 2020; Yang & Yin, 2018). The average value of Size is 21.884, and the average return on assets is 4%. On average, the industry year median leverage ratio reaches 45.1%, while the average

| Variables   | Obs | Mean | Median | S.D.  | Min     | Max     |
|-------------|-----|------|--------|-------|---------|---------|
| DLEV        | 7858 | 0.062 | 0.014  | 0.387 | −0.896  | 16.089  |
| LEV         | 7858 | 0.457 | 0.460  | 0.209 | 0.050   | 0.897   |
| \( \Delta Debt \) | 7858 | 0.174 | 0.111  | 0.324 | −0.018  | 0.283   |
| \( \Delta Equity \) | 7858 | 0.167 | 0.069  | 0.362 | 0.019   | 0.166   |
| \( \Delta Short \) | 7858 | 0.027 | 0.006  | 0.254 | −0.107  | 0.119   |
| \( \Delta Long \) | 7858 | 0.163 | −0.077 | 10.049 | −0.361 | 0.296   |
| \( \Delta E_{\text{Retain}} \) | 7858 | 0.172 | 0.062  | 0.549 | −5.147  | 6.322   |
| \( \Delta E_{\text{Other}} \) | 7858 | 0.344 | 0.007  | 2.542 | −8.431  | 84.213  |
| Mixrate     | 7858 | 0.228 | 0.125  | 0.245 | 0.000   | 1.000   |
| SIZE        | 7858 | 21.884 | 21.759 | 1.206 | 15.979  | 25.523  |
| ROA         | 7858 | 0.040 | 0.036  | 0.060 | −0.193  | 0.224   |
| GROWTH      | 7858 | 0.219 | 0.108  | 0.458 | −0.425  | 3.089   |
| FATA        | 7858 | 0.243 | 0.209  | 0.175 | 0.002   | 0.748   |
| SHRRC1      | 7858 | 0.357 | 0.337  | 0.150 | 0.089   | 0.750   |
| IND_LEVELV  | 7858 | 0.451 | 0.417  | 0.102 | 0.205   | 0.708   |
| MB          | 7858 | 0.907 | 0.624  | 0.877 | 0.084   | 6.516   |
| NDTS        | 7858 | 0.021 | 0.018  | 0.015 | 0.001   | 0.074   |
| EXP         | 7858 | 0.047 | 0.042  | 0.030 | 0.004   | 0.170   |
| ETR         | 7858 | 0.176 | 0.163  | 0.172 | −0.508  | 0.825   |
| Vcfota      | 7858 | 0.049 | 0.037  | 0.044 | 0.002   | 0.254   |
| Vebitta     | 7858 | 0.029 | 0.017  | 0.035 | 0.001   | 0.232   |
| Manhold     | 7858 | 0.068 | 0.000  | 0.149 | 0.000   | 0.657   |
Table 3. Difference of deleveraging degree between excess leverage and non-excess leverage for SOEs, central and local SOEs and in regions with different marketisation indexes.

### Panel A Difference of deleveraging degree between excess leverage and non-excess leverage SOEs

| Variable | Non-excess leverage | Excess leverage | Difference in mean value |
|----------|---------------------|-----------------|------------------------|
| $D_{\text{lev}}$ | N | Mean | 3363 | 0.02 | 4019 | 0.04 | −0.02*** |

### Panel B Difference of deleveraging degree between central SOEs and local SOEs

| Variable | Central SOEs | Local SOEs | Difference in mean value |
|----------|--------------|------------|------------------------|
| $D_{\text{lev}}$ | N | Mean | 3302 | 0.02 | 4080 | 0.02 | −0.00 |

### Panel C Difference of deleveraging degree in regions with different marketisation index

| Variable | Low marketisation region | high marketisation region | Difference in mean value |
|----------|--------------------------|----------------------------|------------------------|
| $D_{\text{lev}}$ | N | Mean | 3442 | 0.04 | 3940 | 0.03 | 0.01** |

***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

annual sales growth rate of the sample firms is 21.9%. The mean value of the tangible assets proportion is 24.3%, and the average value of the top shareholding variable $SHRCR1$ is 35.7%, indicating that the ‘large controlling shareholding’ phenomenon remains pervasive among SOEs. The shareholding ratio of management has a mean value of 6.8%. Furthermore, the average value of MB is 0.907, the average value of the non-tax shield ratio is 2.1%. The mean value of the effective tax ratio is 17.6%, and the mean value of the overheads expenses is 4.7%. Additionally, the mean value of SOEs’ operating risk ($Vebitta$) and cash flow risk ($Vcfota$) are 2.9% and 4.9%, respectively.

Table 3 reports the differences in SOE deleveraging degree for regions with different marketisation, whether SOEs have excess leverage or not, central SOEs, and local SOEs. The results of a t-test show that the deleveraging degree is significantly higher for SOEs who do not have excess leverage. The degree of deleveraging is significantly higher in high marketisation regions, indicating that high marketisation can exert a positive effect on the deleveraging behaviour of SOEs. We also find that the difference of deleveraging degree between central and local SOEs is not obvious. This result can provide a preliminary evidence for our further analysis.

### 4.2. Correlation matrix

Table 4 presents the correlation of our main variables. It is shown that the equity balance variable ($Mixrate$) of mixed-ownership reform is significantly and negatively correlated with $D_{\text{lev}}$, indicating that the higher the $Mixrate$, the larger the degree of deleveraging in SOEs. It provides a preliminary confirmation for hypothesis 1. As for the methods of deleveraging, we can see that $Mixrate$ exhibits a significant and positive correlation with $\Delta Equity$, which shows that the equity balance between state-owned shareholders and non-state-owned shareholders can promote the deleveraging behaviour of SOEs through the method of equity increase.

Additionally, firm size ($SIZE$), return on total assets ($ROA$), proportion of tangible assets ($FATA$), industry year median leverage ($IND_{\text{LEVB}}$), non-debt tax shield ($NDTS$) and effective tax ratio ($ETR$) are significantly and negatively correlated with the deleveraging degree. The relationship between control variables and the deleveraging degree is
Table 4. Correlation matrix.

|          | (1)   | (2)   | (3)   | (4)   | (5)   | (6)   | (7)   | (8)   | (9)   | (10)  | (11)  | (12)  | (13)  | (14) |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|
| `DLEV`   | 1     |       |       |       |       |       |       |       |       |       |       |       |       |      |
| `ΔDebt`  | 0.749 | 1     |       |       |       |       |       |       |       |       |       |       |       |      |
| `ΔEquity`| -0.268| 0.175 | 1     |       |       |       |       |       |       |       |       |       |       |      |
| `Mixrate`| -0.037| -0.015| 0.073 | 1     |       |       |       |       |       |       |       |       |       |      |
| `SIZE`   | -0.048| 0.061 | 0.082 | -0.003| 1     |       |       |       |       |       |       |       |       |      |
| `ROA`    | -0.037| 0.095 | 0.203 | 0.013 | 0.048 | 1     |       |       |       |       |       |       |       |      |
| `GROWTH` | 0.153 | 0.718 | 0.698 | 0.016 | 0.020 | -0.130| -0.142| 1     |       |       |       |       |       |      |
| `FATA`   | -0.020| -0.130| -0.090| 0.016 | 0.020 | -0.130| -0.142| 1     |       |       |       |       |       |      |
| `SHRCR1` | 0.025 | 0.024 | -0.007| -0.337| 0.265 | 0.131 | 0.023 | 0.051 | 1     |       |       |       |       |      |
| `IND.LEVB`| -0.044| -0.013| 0.006 | -0.006| 0.164 | -0.003| 0.001 | -0.098| 0.043 | 1     |       |       |       |      |
| `MB`     | -0.008| 0.005 | -0.098| -0.018| 0.532 | -0.272| -0.045| 0.075 | 0.085 | 0.293 | 1     |       |       |      |
| `NDTS`   | -0.054| -0.177| -0.115| -0.004| -0.028| -0.120| -0.189| 0.791 | 0.080 | -0.163| 0.008 | 1     |       |      |
| `EXP`    | -0.007| -0.096| -0.094| 0.045 | -0.323| 0.106 | -0.127| -0.048| -0.059| -0.294| -0.324| 0.008 | 1     |      |
| `ETR`    | -0.019| -0.018| 0     | 0.032 | 0.054 | 0.103 | -0.019| -0.039| 0.010 | 0.143 | 0.080 | -0.047| -0.037| 1    |

Superscripts a, b and c denote significance at the 1%, 5% and 10% levels, respectively.
basically consistent with existing literature. Additionally, the correlation coefficients between the control variables are small, indicating that the regression model does not have a serious multicollinearity problem.

### 4.3. Regression results

#### 4.3.1. Mixed-ownership reform and degree of deleveraging

Table 5 reports the test results of Hypothesis 1. The explanatory variable in column (1) shows that the regression coefficient of *Mixrate* is 0.029, which is significant at the 5% level. This result indicates that the higher the equity balance between state-owned shareholders and non-state-owned shareholders of SOEs, the higher the degree of deleveraging in SOEs. The result supports Hypothesis 1, that is, the higher the degree of SOEs’ mixed-ownership reform, the larger the degree of deleveraging of SOEs. Column (2) repeats the same regression but controls for the problem of heteroskedasticity reveal that

Table 5. Mixed-ownership reform and degree of deleveraging.

|          | (1) OLS | (2) Robust |
|----------|---------|------------|
|          | DLEV    | DLEV       |
| **Mixrate** | −0.029**  | −0.029*    |
|          | (−2.15) | (−1.80)    |
| **SIZE**  | −0.005  | −0.005     |
|          | (−1.47) | (−1.56)    |
| **ROA**   | −0.803*** | −0.803***  |
|          | (−14.30) | (−13.45)   |
| **GROWTH** | 0.214*** | 0.214***   |
|          | (27.09)  | (6.65)     |
| **FATA**  | 0.010   | 0.010      |
|          | (0.36)   | (0.34)     |
| **SHRCR1** | 0.036   | 0.036      |
|          | (1.59)   | (1.18)     |
| **IND.LEVB** | −0.108 | −0.108     |
|          | (−1.30)  | (−1.04)    |
| **MB**    | −0.004  | −0.004     |
|          | (−0.85)  | (−1.22)    |
| **NDTS**  | −0.841*** | −0.841***  |
|          | (−2.68)  | (−2.78)    |
| **EXP**   | −0.841*** | 0.331***   |
|          | (−2.68)  | (3.14)     |
| **ETR**   | 0.003   | 0.003      |
|          | (0.18)   | (0.24)     |
| **Vcfota** | −0.103 | −0.103     |
|          | (−1.39)  | (−1.44)    |
| **Vebitta** | −0.133 | −0.133     |
|          | (−1.42)  | (−1.53)    |
| **Manhold** | 0.294*** | 0.294***   |
|          | (7.36)   | (5.80)     |
| **constant** | 0.313*** | 0.313***   |
|          | (3.67)   | (3.06)     |
| **YEAR**  | YES      | YES        |
| **INDUST** | YES      | YES        |
| **Obs**   | 7858     | 7858       |
| **R**−adj | 0.077    | 0.077      |

***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively. T-statistics computed with robust standard errors clustered at the firm level are reported in parentheses.
the result is unchanged. Among the control variables, the regression coefficients of ROA, \(N D T S\) and \(E X P\) are all significantly negative, indicating that the higher the return on assets, the higher the non-debt tax shield, and the larger the overhead expenses, the higher the degree of deleveraging of SOEs. The regression results for the variables \(G R O W T H\) and \(M a n h o l d\) are both significantly positive, implying that the higher the growth opportunity and the higher the level of management shareholding, the lower the degree of deleveraging in SOEs.

4.3.2. Mixed-ownership reform and methods of deleveraging

Lu (2020) demonstrates that research on deleveraging should pay more attention to the methods which the firms choose to deleverage, as it directly affects the relationship between deleveraging and economic growth. Although there exists some contradiction between deleveraging and economic growth, if firms choose reasonable methods to deleverage, the growth of the economy will not be affected. Thus, studying the methods of deleveraging is as important as studying the degree of deleveraging when we investigate the economic consequences of SOE mixed-ownership reform. Following DeAngelo et al. (2018) and Zhou et al. (2020), this paper studies deleveraging methods from the dimension of debt repayment and equity increase. Debt repayment is the single most important endogenous element of deleveraging. Equity increase can directly increase the denominator of the leverage ratio and reduce the leverage ratio for firms that have debt outstanding. While debt repayment is the most important direct contributor to deleveraging, its impact is not fully independent of the new equity capital that firms obtain through earnings retention and share-issuance proceeds (DeAngelo et al., 2018). Zhou et al. (2020) show that despite debt repayment and equity increase, both can lead to a decline in leverage ratio, and debt repayment may require firms to sell assets or use their own cash flow to repay their debts, which will reduce their cash flow for investing in other profitable projects. As for the external economy, debt repayment may lead the economy to fall into a ‘liquidity trap’. However, equity increase can introduce more funds to enlarge production scale and expand asset scale at the same time, reducing the firm’s debt ratio. Thus, compared with debt repayment, equity increase is a positive way to deleverage, especially for firms who have excess leverage and lack enough cash flow to repay their debts.

Mixed-ownership reform can introduce non-state-owned share capital into SOEs, which will enlarge the equity capital scale and result in deleveraging of SOEs. On the other hand, the participation of non-state-owned shareholders in corporate governance helps to improve the efficiency of monitoring and incentive mechanisms of SOEs, e.g. the introduction of non-state-owned shareholders is beneficial to improving executive pay-for-performance sensitivity (Cai et al., 2018), which will have a positive impact on company performance. The improvement of performance can promote SOEs to increase earnings retention, which can also help SOEs to deleverge. Further, improvement in profitability can increase the free cash flow of SOEs, which can be used to repay maturing debt and to deleverage.

Table 6 presents the results of Hypothesis 2a. The explanatory variable in column (1) shows that the regression coefficient of \(M i x r a t e\) is 0.048, which is significantly positive with \(\Delta E q u i t y\) at the 1% level, thus supporting Hypothesis 2a. This result indicates that the higher the degree of SOEs’ mixed-ownership reform, the larger the equity capital – that is,
Table 6. Mixed-ownership reform and methods of deleveraging: Equity capital increase.

|        | (1) ΔEquity | (2) ΔE_Retain | (3) ΔE_Other | (4) ΔE_Capital | (5) ΔE_Earnings |
|--------|-------------|---------------|--------------|----------------|----------------|
| Mixrate | 0.048***    | 0.103*        | 0.203        | 0.111          | 0.663**        |
| SIZE   | −0.000      | −0.020        | 0.034        | 0.111          | 0.030          |
| ROA    | 0.908***    | 0.859***      | −0.753       | −1.120***      | 4.699***       |
| GROWTH | 0.876***    | 1.238***      | 2.394***     | 1.866***       | 0.659***       |
| FATA   | 0.013       | 0.178         | 0.262        | 0.280          | 0.348          |
| SHRCR1 | −0.054***   | 0.078         | 0.155        | 0.047          | 0.163          |
| INDLEV | −0.054      | −0.195        | −0.335       | −0.446         | 0.739          |
| MB     | −0.027***   | −0.043**      | −0.054       | −0.021         | −0.110         |
| NDTS   | 0.567**     | 2.382         | 1.673        | 1.733          | 6.161          |
| EXP    | −0.633***   | −1.445***     | −2.454       | −0.310         | −2.072         |
| ETR    | 0.027*      | −0.007        | −0.160       | −0.047         | 0.173          |
| Vcfata | 0.162**     | 0.538*        | −0.264       | 0.906          | 1.007          |
| Vebitta| 0.601***    | 0.782**       | 1.172        | −0.112         | 2.696          |
| Manhold| −0.147***   | 1.038         | 9.896***     | 2.471***       | −6.327**       |
| Constant | 0.000      | 0.280         | −0.799       | 0.131          | −1.262         |
| YEAR   | YES         | YES           | YES          | YES            | YES            |
| INDUST | YES         | YES           | YES          | YES            | YES            |
| Obs    | 7858        | 7858          | 7858         | 7858           | 7858           |
| R² adj | 0.606       | 0.478         | 0.216        | 0.435          | 0.064          |

***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively. T-statistics computed with robust standard errors clustered at the firm level are reported in parentheses.

mixed-ownership reform promotes the SOEs that choose the equity capital increase method to deleverage. From the specific elements of equity capital, the results also show that it was the increase in capital and retained earnings that helped SOEs to deleverage. Column (2) shows that the coefficient of Mixrate is significantly positive with ΔE_Retain at the 10% level, but column (3) shows that the coefficient of Mixrate with ΔE_Other is not significant. Zhou et al. (2020) note that share issuance and earnings retention provide cash that could be used for creating profitable programmes and new investment, which will enhance the firm’s ability to create ‘new blood’ and ensure the firm’s sustainable development; thus, it is a way to introduce resources and reduce expenditures. Thus, it is a positive way to deleverage. However, the increase in other comprehensive income mainly comes from the revaluation surplus, which is unrealised income and has no impact on the real capacity of deleveraging of SOEs. Thus, it is a negative way to deleverage. According to the regression results in Table 6, we can reach the conclusion that SOE mixed-ownership reform promotes SOEs’ deleveraging in a positive and sustainable way.
Additionally, considering the direct effect of the introduction of non-state-owned share capital on the leverage ratio, we further divide equity capital and retained earnings (ΔE_Retain) into Δshare issue (ΔE_Capital) and earnings retention (ΔE_Earnings). Column (4) and column (5) show that the regression coefficient of Mixrate is significantly and positively correlated with ΔE_Earnings, but not significantly with ΔE_Capital, which indicates that the deleveraging effect of ΔE_Retain is not driven by the introduction of non-state-owned share capital but through the means of internally generated equity.

Table 7 reports the result for Hypothesis 2b. For this analysis, we explore the impact of SOE mixed-ownership reform on deleveraging behaviour from the dimension of debt repayment. Column (1) shows that the coefficient of Mixrate is significantly negative, indicating that the higher the degree of SOEs’ mixed-ownership reform, the higher the degree of debt repayment. That is, SOEs’ mixed-ownership reform can promote the choice of debt repayment to deleveraging. The regression result supports Hypothesis 2b. Furthermore, column (2) and column (3) shows that SOEs’ mixed-ownership reform promotes the deleveraging of SOEs mainly by the way of short debt repayment. The

| Table 7. Mixed-ownership reform and methods of deleveraging: Debt repayment. |
|-----------------|----------|----------|----------|
|                  | (1)      | (2)      | (3)      |
|                  | ΔDebt    | ΔShort   | ΔLong    |
| Mixrate          | −0.043***| −0.038*  | −0.389   |
|                  | (−2.01)  | (−1.95)  | (−0.52)  |
| SIZE             | −0.024***| −0.003   | −0.029   |
|                  | (−4.51)  | (−0.52)  | (−0.16)  |
| ROA              | −0.628***| −0.363***| −0.021   |
|                  | (−6.18)  | (−3.90)  | (−1.39)  |
| GROWTH           | 1.368*** | 0.873*** | 6.287*** |
|                  | (74.59)  | (51.94)  | (9.55)   |
| FATA             | −0.008   | 0.075*   | −1.401   |
|                  | (−0.19)  | (1.93)   | (−0.96)  |
| SHRCR1           | 0.140*** | 0.028    | 0.497    |
|                  | (4.15)   | (0.91)   | (0.42)   |
| IND_LEVB         | −0.329** | 0.019    | −0.425   |
|                  | (−2.08)  | (0.13)   | (−0.08)  |
| MB               | 0.007    | −0.001   | −0.281   |
|                  | (1.11)   | (−0.24)  | (−1.30)  |
| NDTFS            | −0.944** | −1.436***| 0.253    |
|                  | (−2.12)  | (−3.51)  | (0.02)   |
| EXP              | −0.034   | −0.010   | 11.719** |
|                  | (−0.20)  | (−0.07)  | (1.90)   |
| ETR              | −0.012   | −0.028   | −0.031   |
|                  | (−0.51)  | (−1.31)  | (−0.04)  |
| Vcfota           | −0.125   | 0.000    | −2.523   |
|                  | (−0.89)  | (0.00)   | (−0.51)  |
| Vebitta          | −0.076   | −0.529***| 3.258    |
|                  | (−0.38)  | (−2.90)  | (0.46)   |
| Manhold          | 0.357*** | 0.261*** | 2.111    |
|                  | (6.32)   | (5.03)   | (0.89)   |
| Constant         | 0.704*** | 0.165    | 0.837    |
|                  | (5.17)   | (1.33)   | (0.18)   |
| YEAR             | YES      | YES      | YES      |
| INDUST           | YES      | YES      | YES      |
| Obs              | 7858     | 7858     | 7858     |
| R²_adj           | 0.532    | 0.368    | 0.023    |

***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively. T-statistics computed with robust standard errors clustered at the firm level are reported in parentheses.
coefficient of Mixrate is significant and negative at the 10% level in column (2) but not significant in column (3). This is probably because compared with non-SOEs, SOEs’ current liability is more likely to be excessive (Lu et al., 2015). Thus, SOEs are more likely to repay short debt to avoid the risk of distress.

5. Further analysis

5.1. Mixed-ownership reform, excess leverage, and deleveraging

Xu et al. (2020) find that excess leveraged firms are more likely to deleverage and their deleveraging degree is higher. Thus, to avoid the influence of excess leverage SOEs on our results, we divide our sample into a subsample based on whether the firms have excess leverage or not. Following prior studies (Harford et al., 2009; Lu et al., 2015; Wang et al., 2019), we define excess leverage as the difference between a firm’s actual and predicted book leverage in a given year.

To calculate a firm’s predicted leverage, we use predicted values from the same Tobit regression model used in Harford et al. (2009). The variables that are used to predict leverage are profitability (ROA), asset tangibility (FATA), firm sizes (SIZE), median industry leverage (IND_LEVB), ownership (SOE), growth opportunities (GROWTH) and shareholding percentage of the first largest shareholder (SHRCR1). By estimating separate annual regressions, we are able to exclude expected inflation from the model, as this variable is uniform across all firms for any given year. We establish the following equation to calculate the target leverage.

\[
LEBV_{i,t} = \alpha_0 + \alpha_1 SOE_{i,t-1} + \alpha_2 ROA_{i,t-1} + \alpha_3 IND_LEVB_{i,t-1} + \alpha_4 GROWTH_{i,t-1} + \alpha_5 FATA_{i,t-1} + \alpha_6 SIZE_{i,t-1} + \alpha_7 SHRCR_{i,t-1} + \varepsilon
\]  

(2)

Table 8 reports the regression results of excess and non-excess leverage SOEs; column (1) and column (2) show that the coefficient of Mixrate is significant for companies who have excess leverage but not for companies who do not have excess leverage. The results indicate that SOEs’ mixed-ownership reform helps SOEs reduce the unreasonable part of their liability, but not the reasonable part. Additionally, Table 3 Panel A shows that the deleveraging degree of non-excess leverage SOEs is higher than that of excess leverage SOEs. The regression results of this part show that SOEs’ mixed-ownership reform can promote the deleveraging degree of excess leverage SOEs, which indicates that the result is not driven by different levels of SOE leverage.

5.2. Mixed-ownership reform, central and local SOEs, and deleveraging

For this analysis, we divide our sample into a subsample based on the level of SOEs, that is, central SOEs and local SOEs. Column (3) and column (4) of Table 8 report the results of the regression, which show that the coefficient of Mixrate is significant and negative, indicating that the higher the degree of SOE mixed-ownership reform, the higher the deleveraging degree in both central and local SOEs. Xu et al. (2020) find that the forbidden deleveraging policy has not affected the deleveraging behaviour of local SOEs. Our results indicate that compared with the forbidden deleveraging policy, SOEs’ mixed-ownership reform is more effective in the deleveraging of SOEs. Additionally, Table 3 Panel B shows
### Mixed-ownership reform and deleveraging: Further analysis

|        | DLEV | DLEV | DLEV |
|--------|------|------|------|
|        | (1) Excess leverage | (2) Non-excess leverage | Central SOEs | Local SOEs | (3) Low marketisation | (4) High marketisation |
| **Mixrate** | −0.051*** | −0.003 | −0.111*** | −0.029** | −0.047*** | −0.002 |
|         | (−3.19) | (−0.12) | (−3.30) | (−2.16) | (−2.26) | (−0.14) |
| **SIZE** | −0.000 | −0.019*** | −0.011 | 0.007* | 0.002 | −0.014*** |
|         | (−0.04) | (−2.86) | (−1.46) | (1.82) | (0.32) | (−3.06) |
| **ROA** | −0.852*** | −0.586*** | −0.898*** | −0.735*** | −0.929*** | −0.683*** |
|         | (−11.08) | (−6.09) | (−7.08) | (−13.14) | (−10.96) | (−9.29) |
| **GROWTH** | 0.257*** | 0.152*** | 0.228*** | 0.147*** | 0.213*** | 0.216*** |
|         | (28.00) | (10.22) | (13.29) | (16.64) | (18.55) | (20.07) |
| **FATA** | −0.008 | −0.016 | 0.005 | 0.008 | −0.015 | 0.055 |
|         | (−0.23) | (−0.31) | (0.06) | (0.33) | (−0.37) | (1.34) |
| **SHCR1** | −0.035 | 0.117*** | −0.097* | 0.046** | 0.032 | 0.039 |
|         | (−1.29) | (3.01) | (−1.69) | (2.02) | (0.95) | (1.33) |
| **IND_LEVB** | 0.050 | −0.296** | −0.094 | −0.097 | −0.098 | −0.147 |
|         | (0.50) | (−2.07) | (−0.45) | (−1.28) | (−0.72) | (−1.44) |
| **MB** | −0.009* | 0.017 | −0.003 | −0.007* | −0.006 | −0.000 |
|         | (−1.93) | (1.08) | (−0.40) | (−1.85) | (−0.97) | (−0.01) |
| **NDTS** | −0.283 | −1.273*** | −0.309 | −1.071*** | −0.569 | −1.124*** |
|         | (−0.76) | (−2.34) | (−0.39) | (−3.98) | (−1.22) | (−2.68) |
| **EXP** | 0.176 | 0.373*** | 0.004 | 0.205* | 0.340* | 0.349** |
|         | (1.23) | (1.97) | (0.01) | (1.85) | (1.87) | (2.42) |
| **ETR** | −0.015 | 0.057* | −0.002 | −0.006 | −0.008 | 0.016 |
|         | (−0.87) | (1.68) | (−0.04) | (−0.40) | (−0.33) | (0.70) |
| **Vcfota** | −0.044 | −0.196 | 0.063 | −0.112 | −0.059 | −0.130 |
|         | (−0.50) | (−1.51) | (0.37) | (−1.52) | (−0.49) | (−1.45) |
| **Vebitta** | 0.197* | −0.689*** | −0.145 | −0.106 | −0.247* | −0.041 |
|         | (1.73) | (−4.15) | (−0.67) | (−1.12) | (−1.82) | (−0.32) |
| **Manhold** | 0.167*** | 0.352*** | 0.460 | 0.911*** | 0.264*** | 0.292*** |
|         | (2.71) | (6.20) | (1.16) | (3.69) | (3.87) | (6.16) |
| **Constant** | 0.096 | 0.751*** | 0.646*** | −0.026 | 0.178 | 0.507*** |
|         | (0.94) | (4.81) | (3.18) | (−0.31) | (1.33) | (4.52) |
| **YEAR** | YES | YES | YES | YES | YES | YES |
| **INDUST** | YES | YES | YES | YES | YES | YES |
| **Obs** | 4019 | 3839 | 1505 | 6353 | 4348 | 3510 |
| **R_**adj | 0.114 | 0.053 | 0.097 | 0.096 | 0.072 | 0.086 |

***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively. T-statistics computed with robust standard errors clustered at the firm level are reported in parentheses.

Table 8: Mixed-ownership reform and deleveraging: Further analysis.

That the difference of deleveraging degree between central SOEs and local SOEs is not significant. The results of this part confirm that the positive impact of SOEs’ mixed-ownership reform on deleveraging is both significant in central and local SOEs.

### 5.3. Mixed-ownership reform, marketisation and deleveraging

Existing research has proved that the efficiency of SOEs’ mixed-ownership reform differs with a different degree of marketisation. Thus, we divide our sample into a subsample based on the degree of marketisation in the province where the listed company is located. The marketisation index was compiled by Wang, Fan, et al. (2019). Regression results are shown in column (5) and column (6) of Table 8, which shows that SOEs’ mixed-ownership reform has a positive impact on the deleveraging degree of SOEs in lower marketisation...
regions. The coefficient of Mixrate is significant at the 5% level, which indicates that SOEs’ mixed-ownership reform can make up for the deficiencies of marketisation with regard to the governance of leverage. Additionally, Table 3 Panel C shows that the deleveraging degree of SOEs in high marketisation regions is higher than SOEs in low marketisation regions. The regression results of this part show that SOEs’ mixed-ownership reform can promote the deleveraging degree of SOEs in lower marketisation regions, which indicates that the result is not driven by the high level of marketisation.

6. Further analysis: Economic consequences

Similar in spirit to Myers (1997), we adopt the view that a firm’s capital structure is dynamic. Specifically, we allow for the situation that a firm’s leverage can temporarily deviate from its optimal level due to random shocks and firms do not immediately resolve the resulting deviation, or excess leverage, because of transaction costs. Under this approach, the target and excess components of leverage have very different economic implications for the firm. Excess leverage has a negative effect on a firm’s future return (Caskey et al., 2012). Thus, for SOEs who are excess leveraged, deleveraging can help them adjust their leverage to the target value and increase firm value. We further examine whether SOEs’ operating performance has improved after deleveraging. We use the change of ROA (return on asset) to measure the operating performance. Existing research mainly uses ROE (return on net asset), ROA (return on assets) and TobinQ to measure firms’ performance. However, with the division of tradable and non-tradable shares in China’s capital market, TobinQ may not measure a firm’s value accurately, it has too much noise. ROE mainly reflects a firm’s ability to obtain capital, it is not suitable for measuring performance. Therefore, we follow Zhu and Zhang (2013) and use ROA to measure performance, which is stability and comparability. To better reflect the change in performance, we use the change in ROA as the dependent variable. Specifically, we construct the following regression model:

\[
CROA_{i,t} = \delta_0 + \delta_1 \text{dlev}_{i,t} + \delta_2 \text{Mixrate}_{i,t} + \delta_3 \text{dlev}_{i,t} \times \text{Mixrate}_{i,t} + \delta_4 \text{Controls}_{i,t} + \text{INDUSTRY} + \text{YEAR} + \epsilon
\]

(3)

Following Qi et al. (2018), we use the change in return on assets (CROA) to measure the operating performance and introduce the interaction of dlev and Mixrate to explore the economic consequences of deleveraging. The regression controls for firm size (SIZE), sales growth (GROWTH), proportion of tangible assets (FATA), industry median leverage (IND_LEVB), top shareholding (SHRCR1), non-debt tax shield (NDTS), overhead expenses to total assets (EXP), effective tax rate ratio (ETR), standard deviation of cash flow (Vcfota), standard deviation of EBIT (Vebitta), market-to-book ratio (MB), management shareholding (Manhold), year (YEAR)/ and industry (INDUSTRY) variables.
The regression results of model (3) are presented in Table 9. Column (1) of Table 9 shows that the coefficient of \( dlev \times \text{Mixrate} \) (the interaction of \( dlev \) and \( \text{Mixrate} \)) is significant at the 5% level, indicating that SOEs’ operating performance improved after deleveraging. That is, SOEs’ mixed-ownership reform can promote the deleveraging of SOEs, and it has a positive impact on performance. Furthermore, we divide the sample according to the degree of leverage, and perform the regression for the excess leverage subsample. Column (2) of Table 9 shows that the positive impact of deleveraging on operating performance is more significant for excess leveraged firms, the coefficient of \( dlev \times \text{Mixrate} \) (the interaction of \( dlev \) and \( \text{Mixrate} \)) is significant at the 1% level, which confirms the conclusion that deleveraging can improve firm value for excess leveraged firms (DeAngelo et al., 2018).

| variables         | Full sample (1) | Excess leverage sample (2) |
|-------------------|-----------------|---------------------------|
| \( dlev \)        | \(-0.025^{***} \) | \(-0.052^{***} \)         |
|                   | \((-8.20)\)     | \((-9.58)\)               |
| \( \text{Mixrate} \) | \(-0.004 \)    | \(-0.004 \)               |
|                   | \((-1.49)\)     | \((-1.25)\)               |
| \( dlev \times \text{Mixrate} \) | \(-0.023^{**} \) | \(-0.052^{**} \)         |
|                   | \((-2.11)\)     | \((-2.57)\)               |
| \( \text{SIZE} \) | \(-0.001^{**} \) | \(-0.002^{***} \)         |
|                   | \((-2.35)\)     | \((-2.80)\)               |
| \( \text{GROWTH} \) | 0.006^{***}    | 0.010^{***}               |
|                   | (2.99)          | (3.99)                    |
| \( \text{FATA} \) | 0.011^{**}      | 0.016^{***}               |
|                   | (2.22)          | (2.65)                    |
| \( \text{SHRCR1} \) | \(-0.003 \)    | \(-0.000 \)               |
|                   | \((-0.66)\)     | \((-0.05)\)               |
| \( \text{IND\_LEVB} \) | 0.011          | 0.026                     |
|                   | (0.61)          | (1.08)                    |
| \( \text{MB} \)  | \(-0.002^{***} \) | \(-0.002^{***} \)         |
|                   | \((-2.90)\)     | \((-2.66)\)               |
| \( \text{NDTS} \) | \(-0.098^{*} \) | \(-0.188^{***} \)         |
|                   | \((-1.90)\)     | \((-2.95)\)               |
| \( \text{EXP} \) | 0.013           | 0.002                     |
|                   | (0.66)          | (0.10)                    |
| \( \text{ETR} \) | 0.012^{***}     | 0.011^{***}               |
|                   | (4.68)          | (3.88)                    |
| \( \text{Vcfota} \) | 0.004          | \(-0.018 \)               |
|                   | (0.27)          | \((-0.85)\)               |
| \( \text{Vebitta} \) | \(-0.129^{***} \) | \(-0.117^{***} \)         |
|                   | \((-5.68)\)     | \((-4.14)\)               |
| \( \text{Manhold} \) | \(-0.010 \)    | 0.001                     |
|                   | \((-1.47)\)     | (0.10)                    |
| \( \text{Constant} \) | 0.009          | 0.016                     |
|                   | (0.55)          | (0.84)                    |
| \( \text{YEAR} \) | YES             | YES                       |
| \( \text{INDUST} \) | YES            | YES                       |
| Obs               | 5511            | 3476                      |
| \( R^2_{\text{adj}} \) | 0.092          | 0.145                     |

***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively. T-statistics computed with robust standard errors clustered at the firm level are reported in parentheses.
7. Robustness tests

To increase the reliability of the research results, we conduct the following robustness tests: 1) Exclude samples after 2015; 2) Exclude samples of 2015; 3) Use one-year lagged values of the independent variable; 4) Use the instrumental variable method to solve any possible endogenous problem; 5) Exclude non-deleveraging samples; 6) Control for firm fixed effects.

7.1. Considering the impact of forbidden deleveraging policy

China implemented the forbidden deleveraging policy in 2015, which may have some effect on the reliability of our results. Thus, to rule out this effect on the results, we remove the samples in 2015 and perform the regression of model (1) again. The regression results are provided in Table 10. Column (2) shows that the results remain valid after removing the samples in 2015, suggesting that the impact

|                  | Samples before 2015 (1) | Excluding samples in 2015 (2) |
|------------------|------------------------|-------------------------------|
| **DLEV**         | (−0.029*)              | (−0.033**)                   |
|                  | (−1.88)                | (−2.10)                      |
| **Mixrate**      | (−0.004)               | (−0.006)                     |
|                  | (−0.97)                | (−1.42)                      |
| **ROA**          | (−0.836***)            | (−0.817***)                  |
|                  | (−13.04)               | (−12.66)                     |
| **GROWTH**       | 0.242***               | 0.220***                     |
|                  | (26.05)                | (25.00)                      |
| **SIZE**         | 0.019                  | 0.023                        |
|                  | (0.59)                 | (0.70)                       |
| **SHRCR1**       | 0.019                  | 0.032                        |
|                  | (0.72)                 | (1.26)                       |
| **IND.LEVB**     | (−0.036)               | (−0.094)                     |
|                  | (−0.40)                | (−0.96)                      |
| **MB**           | (−0.007)               | (−0.005)                     |
|                  | (−1.42)                | (−1.05)                      |
| **NDTS**         | (−0.715**)             | (−0.843**)                   |
|                  | (−2.05)                | (−2.35)                      |
| **EXP**          | 0.203                  | 0.279**                      |
|                  | (1.56)                 | (2.10)                       |
| **ETR**          | 0.003                  | 0.007                        |
|                  | (0.15)                 | (0.39)                       |
| **Vcfota**       | (−0.048)               | (−0.071)                     |
|                  | (−0.58)                | (−0.85)                      |
| **Vebitta**      | (−0.119)               | (−0.209**)                   |
|                  | (−1.12)                | (−1.98)                      |
| **Manhold**      | 0.407****              | 0.359***                     |
|                  | (7.49)                 | (7.48)                       |
| **截距**         | 0.263***               | 0.305***                     |
|                  | (2.75)                 | (3.07)                       |
| **YEAR**         | YES                    | YES                          |
| **INDUST**       | YES                    | YES                          |
| **N**            | 5574                   | 6775                         |
| **R^2_adj**      | 0.085                  | 0.081                        |

***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively. T-statistics computed with robust standard errors clustered at the firm level are reported in parentheses.
of the forbidden deleveraging policy is not a concern. Additionally, we exclude the samples after 2015 and perform the regression again. The regression results are shown in column (1); the coefficient of \textit{Mixrate} is still significant. These findings demonstrate that the impact of SOEs’ mixed-ownership reform on the deleveraging behaviour of SOEs is not driven by the forbidden deleveraging policy.

### 7.2. Two-stage regression

Since SOEs implementing deleverage have better corporate governance and are more likely to attract non-state-owned shareholders to invest, our analysis may have an endogenous problem. To control for endogenous problems, we employ the willingness of the government to decentralise \((\textit{Pca})\) as an instrumental variable for mixed-ownership reform. \textit{Pca} data were obtained from the National Bureau of Statistics of China. The research by Yi et al. (2021) and Ma et al. (2020) finds that the willingness of decentralisation from the government will decrease the barriers for non-state-owned capital to enter the SOEs, thereby inhibiting mixed-ownership reform. Therefore, this variable meets the relevance requirements. Since the willingness of decentralisation from the government is formulated in accordance with the national development strategy and has no direct influence on the deleveraging of SOEs, this variable meets the exogenous requirements.

To further illustrate the validity of the instrumental variable, we use the two-stage least squares (2SLS) method to dismiss the possible influence of endogeneity. On the first-stage regression, we directly test the relationship between the instrumental variable \textit{Pca} and the independent variable \textit{Mixrate}; column (1) of Table 11 shows that \textit{Pca} is significantly positive with \textit{Mixrate}, indicating that \textit{Pca} can replace \textit{Mixrate} to some extent. On the second-stage regression, we add the fitted value for \textit{Mixrate} to the main regression model (1), and the regression results are presented in Table 11 column (2). The results indicate that the coefficient of the explanatory variable \textit{Mixrate} remains significant. The results prove that our conclusions are still robust after further considering endogeneity.

### 7.3. Controlling for firm fixed effects

To further alleviate the endogenous problem, we control for firm fixed effects in the regression. Bloom et al. (2013) find that this approach can better control for the influence of some unobservable factors on the dependent variable at the firm level. The results of controlling for firm fixed effects are shown in Table 12. It shows that the coefficient of \textit{Mixrate} is significantly negative, which is consistent with the main result and further supports our conclusion.

### 7.4. Excluding non-deleveraging samples

To rule out the effect of non-deleveraging samples on our conclusion, we remove the non-deleveraging samples and perform the regression of model (1) again. The regression results are provided in Table 12 column (2). It shows that the results remain valid after removing the non-deleveraging samples, suggesting that the impact of non-deleveraging samples is not a concern.
7.5. Using one-year lagged values of independent variable

To alleviate the potential endogenous problem, we employ a one-year lagged value of independent variable in the regression ($L.\text{Mixrate}$). The regression results are presented in Table 12 column (3). The coefficient of $L.\text{Mixrate}$ remains significantly negative, which further supports our conclusion.

8. Conclusions

The Chinese authorities’ policy for non-financial corporate deleveraging was initiated in 2015. In 2018, the Central Government of China issued the deleveraging policy, which required the SOEs to lower their average ratio of liability to assets by 2% by 2020 from 2017 levels, and an asset-liability constraint mechanism would be created for SOEs to strengthen supervision over their deleveraging moves. In view of the emergency and

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### Table 11. Two-stage regression.

|          | (1) Mixrate | (2) DLEV |
|----------|-------------|----------|
| $\text{Mixrate}$ | 0.979***    | −0.345*  |
| $PCa$     | (3.26)      | (−1.73)  |
| $SIZE$    | 0.030***    | −0.025***|
|           | (10.55)     | (−3.37)  |
| $\text{ROA}$ | 0.172***    | −0.505***|
|           | (3.19)      | (−6.26)  |
| $\text{GROWTH}$ | 0.022***    | 0.189*** |
|           | (2.92)      | (5.84)   |
| $\text{FATA}$ | 0.061***    | −0.012   |
|           | (2.62)      | (−0.31)  |
| $\text{SHRCR1}$ | −0.597***   | 0.293**  |
|           | (−35.75)    | (2.40)   |
| $\text{IND. LEVB}$ | 0.057       | 0.009**  |
|           | (0.74)      | (2.46)   |
| $\text{MB}$  | −0.014***   | 0.099    |
|           | (−3.80)     | (0.76)   |
| $\text{NDTS}$ | −0.266      | −0.563*  |
|           | (−1.08)     | (−1.84)  |
| $\text{EXP}$  | 0.311***    | −0.106   |
|           | (3.37)      | (−0.64)  |
| $\text{ETR}$  | 0.024*      | −0.028** |
|           | (1.83)      | (−2.26)  |
| $\text{Vcfota}$ | 0.131*      | −0.145*  |
|           | (1.94)      | (−1.73)  |
| $\text{Vebitta}$ | 0.018       | −0.112   |
|           | (0.20)      | (−0.76)  |
| $\text{Manhold}$ | −0.351***   | 0.416*** |
|           | (−14.26)    | (3.85)   |
| 截距      | −0.215***   | 0.376*** |
|           | (−2.93)     | (3.32)   |
| $\text{YEAR}$ | YES         | YES      |
| $\text{INDUST}$ | YES        | YES      |
| $N$       | 7858        | 7858     |
| $R^2_{adj}$ | 0.180       | 0.182    |

***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.
significance of the non-financial corporate debt issue, the Chinese authorities have adopted a combination of approaches including improvement of corporate governance, state-owned assets’ supervision reform, mixed-ownership reform and the corporate deleveraging strategy. SOEs’ mixed ownership can enhance the monitoring and incentive mechanism of SOEs and will thus reduce the agency costs and improve their performance.

Based on the sample of 2007–2018 listed state-owned companies, we manually collect data on the nature of top 10 shareholders and shareholding ratios to quantify the degree of a company’s mixed-ownership reform from the dimension of ownership structure. On this basis, we examine the impact of SOEs’ mixed-ownership reform on deleveraging behaviour from the perspective of degree and methods. We find that the higher the balance of equity between state-owned shareholders and non-state-owned shareholders, the higher the degree of deleveraging that SOEs implement. On the other hand, we find that SOEs’ mixed-ownership reform mainly promotes deleveraging by earnings retention

| Table 12. Controlling for firm fixed effects and excluding samples of DLEV ≥ 0. |
|-------------------|-------------------|-------------------|
|                   | Control firm fixed effect | Subsample of DLEV < 0 | Use one-year lagged value |
|                   | (1) DLEV             | (2) DLEV           | (3) DLEV                   |
| **Mixrate**       | −0.112***            | −0.019**           | −0.495**                   |
|                   | (−4.71)              | (−2.04)            | (−2.36)                    |
| **L.Mixrate**     | −0.011              | 0.016***           | 0.011                      |
|                   | (−1.15)             | (6.64)             | (1.33)                     |
| **ROA**           | −1.299***           | −0.152***          | −0.707***                  |
|                   | (−16.09)            | (−3.46)            | (−10.86)                   |
| **GROWTH**        | 0.211***            | −0.098***          | 0.220***                   |
|                   | (22.77)             | (−14.75)           | (6.55)                     |
| **FATA**          | 0.060               | 0.041**            | 0.033                      |
|                   | (1.20)               | (2.18)             | (1.01)                     |
| **SHRCR1**        | 0.001               | 0.013              | −0.284*                    |
|                   | (0.01)               | (0.86)             | (−1.83)                    |
| **IND.LEVB**      | −0.119              | 0.027              | −0.077                     |
|                   | (−1.21)             | (0.41)             | (−0.67)                    |
| **MB**            | −0.003              | 0.030***           | −0.013**                   |
|                   | (−0.50)             | (8.45)             | (2.49)                     |
| **NDTS**          | −2.350***           | −0.375*            | −0.941***                  |
|                   | (−4.01)             | (−1.90)            | (−3.02)                    |
| **EXP**           | 0.522***            | 0.557***           | 0.567***                   |
|                   | (2.00)               | (7.47)             | (3.34)                     |
| **ETR**           | 0.013               | −0.002             | 0.011                      |
|                   | (0.64)               | (−0.19)            | (0.77)                     |
| **Vcfota**        | −0.078              | −0.091*            | −0.015                     |
|                   | (−0.76)             | (−1.68)            | (−0.17)                    |
| **Vebitta**       | −0.409***           | −0.300***          | −0.164                     |
|                   | (−3.19)             | (−4.43)            | (−1.60)                    |
| **Manhold**       | 0.348***            | −0.066**           | 0.101                      |
|                   | (2.47)               | (−2.57)           | (0.96)                     |
| 截距              | 0.473***            | −0.497***          | 0.064                      |
|                   | (2.17)               | (−8.12)            | (0.47)                     |
| **YEAR**          | YES                 | YES                | YES                        |
| **INDUST**        | YES                 | YES                | YES                        |
| **Firm**          | YES                 |                    |                            |
| N                 | 7858                | 3342               | 7858                       |
| R² adj            | 0.081               | 0.206              | 0.212                      |

***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.
and short debt reduction. Moreover, we find that the impact of mixed-ownership reform on deleveraging degree is more significant in the SOEs with excess leverage, in low marketisation regions. However, this impact is significant in both central and local SOEs. Our research also finds that SOEs’ deleveraging has increased their operating performance, which suggests that the positive effect of mixed-ownership reform on SOEs’ deleveraging has a positive economic consequence.

The conclusions of this paper provide empirical evidence on the SOEs’ mixed-ownership reform and deleveraging. SOEs can implement deleveraging by the way of mixed-ownership reform. Thus, the government should give full play to the supervision and governance function of non-state-owned shareholders when promoting mixed-ownership reform, reducing the interference of government, especially for firms with excess leverage and firms in low marketisation regions. Furthermore, despite the contradictory relationship between economic growth and deleveraging, we can coordinate both of them efficiently if we choose reasonable methods to deleverage: deleveraging does not necessarily mean the decline of the economy. Therefore, the government should create a fair market environment for non-state-owned capital, promoting and deepening mixed-ownership reform to improve the performance of SOEs and boost economic growth.

Disclosure statement

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