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Capacity utilization shifting or resource-seeking? Benefits for Chinese enterprises participating in the belt and road initiative

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ABSTRACT

This study investigates the benefits gained by Chinese listed enterprises participating in China's Belt and Road Initiative (BRI). We dispel the concern that the BRI provides a way for Chinese firms to shift excess capacity, instead finding that the capacity utilization of BRI participant firms is worsening. State-owned enterprises (SOEs) are the primary contributors to this effect. Moreover, we present evidence that overinvestment and decreased innovation capabilities are the underlying channels of the overcapacity problem. Finally, further analyses reveal distinct benefits accruing to the different ownership structures of BRI-participating enterprises, implying diverse motivations. We demonstrate that domestic political and overseas market resources for non-SOEs in the post-BRI period are significantly improved, which is not the case for SOEs.

1. Introduction

The Belt and Road Initiative (BRI), formally known as the Silk Road Economic Belt and the 21st Century Maritime Silk Road policy, was first proposed by Chinese President Xi Jinping in September 2013 and was officially written into national policy in March 2014. The initiative aims to build connectivity and cooperation across six main economic corridors, encompassing areas of China running geographically to Mongolia and Russia; Eurasian countries; Central and West Asia; and Pakistan and other countries of the Indian subcontinent. BRI-participating economies represent more than one-third of the global GDP and over half the world's population (over 4 billion). Although infrastructure investment is a key aspect of the BRI, its objectives are much broader, including improvements in the bilateral and multilateral cooperation mechanisms of policy communication, trade facilitation, capital flow, and population mobility.¹ Prior research indicates that infrastructure construction (Donaldson and Hornbeck, 2016; Du and Zhang, 2018), political relations (Mansfield and Pevehouse, 2000; Buckley et al., 2007), financial development (Manova, 2008; Desbordes and Wei, 2017), liberalization of trade (Globerman and Shapiro, 2002; Buckley et al., 2007), and cultural distance (Sala et al., 2008) all prominently affect outbound investment. Consequently, the BRI is expected to provide a key avenue for Chinese enterprises to seek outward foreign direct investment (OFDI) opportunities through many avenues, such as political relations, infrastructure, financial support, and cultural communication.

In recent years, China's overseas investment has increased rapidly. At the end of 2019, China's OFDI stock had reached US \$2.2 trillion (Fig. 1), accounting for 6.4% of global foreign direct investment (FDI) stock outflows and moving its global ranking from 17th

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¹ People's Republic of China (2016), *The 13th Five-Year Plan for Economic and Social Development of the People's Republic of China*, March 17.

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in 2010 to 3rd in 2019, only trailing the United States (US \$7.7 trillion) and the Netherlands (US \$2.6 trillion). Investments in BRI-participating economies account for 13.7% of China's total OFDI. By the end of 2019, OFDI had reached US \$179.47 billion within BRI regions, accounting for 8.2% of China's FDI stock.² According to industrial internalization theory, multinational corporations can quickly optimize the allocation of production factors and promote exports through OFDI to release overcapacity problems. Consequently, some have questioned whether the BRI is simply a decapacity policy implemented by China to shift excess capacity and less environmentally friendly industries to other countries (Nugent and Lu, 2021).

The BRI, an infrastructure-led economic integration blueprint, provides broad opportunities for Chinese enterprises and financial institutions to "go global"; however, it also causes enterprises to take on greater investment risk in international operations. Most countries within the BRI region are less developed, with unsound financial-warning markets (Yin et al., 2018), serious inflation problems, high external debt ratios, high nonperforming loan ratios, large balance-of-payments deficits, and low foreign exchange reserves (Zhou et al., 2017). Given the enormous investment risks posed by these countries, shifting production capacity to them is difficult. Additionally, a vast body of research demonstrates that OFDI is not significantly related to excessive capacity reduction (Zhang et al., 2017; Wen, 2017; Bai and Liu, 2018). Given the lack of consensus regarding the effect of OFDI on capacity utilization (CU), it is worthwhile to explore whether the BRI acts as a channel for Chinese enterprises to shift excess capacity to BRI countries.

Using data from 2010 to 2018, we provide the first evaluation of the impact of China's BRI on enterprise CU by applying a time-varying difference-in-differences (DID) analysis to identify the motivations driving Chinese enterprises with different ownership structures to follow this call and determine the benefits gained by participating enterprises. Following previous literature (Wen, 2017; Bai and Liu, 2018), we also conduct propensity score matching (PSM) to manage the treatment and selection effects of the BRI strategy on firms' CUs based on observable characteristics to mitigate the possible endogeneity problem. Our main findings are threefold.

First, in contrast to the literature demonstrating that BRI positively affects the CU of firms (Wang et al., 2020), we show that firm production capacities significantly decline, at a 99% confidence level, after participating in the BRI, and SOEs dominate this effect. On average, the CU of participant firms declined by 6% compared with control peers during the post-BRI announcement period.

Second, increased investment levels and decreased innovation capabilities are responsible for declining CU. Applying the mediating effect model proposed by Baron and Kenny (1986), we find that enterprise investment levels and innovation capabilities changed significantly after participating in the BRI, which could explain the overcapacity problems experienced by enterprises after participating in the BRI. The BRI motivates enterprises to increase investment expenditures, resulting in investment "herd behavior" (Lin et al., 2010) and blind expansions in production. Subsequently, increased investments crowd out research and development (R&D) expenditures, resulting in significant decreases in innovation capabilities, denoted by enterprises' total factor productivity (TFP). These two channels collectively weaken enterprise CU.

Finally, additional analysis reveals improvements in non-SOE resources for both domestic and overseas markets, while SOEs experienced no significant resource improvements. This finding allows us to distinguish the potential motivations of enterprise BRI participation based on different ownership structures to analyze the benefits gained from the BRI. From market and resource-seeking perspectives (Buckley et al., 2007; Morck et al., 2008), we determine that private enterprises obtain a stronger political connection, a higher probability of investing in other, non-nodal countries, and lower overseas investment risk; however, no significant change in these aspects is evident for SOEs. Based on these results, we contend that active participation in the BRI by non-SOEs may be motivated by resource-seeking, while this is not the case for SOEs.

This study makes three notable contributions to the literature. First, we add to the research on the BRI and CU from a microenterprise perspective, demonstrating that the BRI negatively affects the CU of BRI-participating enterprises. This finding differs from previous literature, and we determine that this negative impact is more prominent for SOEs. While many studies have investigated the effects of the BRI, most have centered on topics such as enterprise investment (Chen and Liu, 2018), investment risk (Sun and Qian, 2018), financing constraints (Xu et al., 2019), corporate innovation (Chen et al., 2019), and industrial upgrading (Wang and Lu, 2019). Previous research investigating the impact of the BRI on overcapacity has found largely positive results or covered only a relatively narrow sample period (Li et al., 2021; Nugent and Lu, 2021). In contrast, our conclusion dispels the concern that the BRI is just a Chinese government strategy to transfer excess capacity.

Second, our study provides additional evidence regarding the investment and innovation mechanisms that result in overcapacity when enterprises participate in the BRI, consistent with existing literature (Lin et al., 2010; Wang et al., 2017; Wu and Zhou, 2019; Yu and Chen, 2019). We also uncover the benefits gained by participating enterprises under various ownership structures. For non-SOEs, the BRI has significantly improved political connections and overseas investment opportunities, implying a resource-seeking motivation for BRI participation. However, SOEs do not gain significant benefits, suggesting that their participation may primarily be to fulfill tasks assigned by political bureaus since such enterprises are directly owned by the government.

Finally, we apply a relatively more accurate research approach to develop this research by considering the time-varying factor. Given that each firm has engaged in the BRI at a distinguishable point in time, we use the time-varying PSM-DID approach to conduct a quasi-experiment to alleviate endogeneity problems. We also adopt the time-decaying stochastic frontier analysis (SFA) model (Battese and Coelli, 1992) to measure firms' CU rates, making the decreased CU results more reliable.

The remainder of this paper is organized as follows. We review the related literature and propose the theory foundation in Section 2; discuss our sample, variables, and research methods in Section 3; present the empirical results and mechanism analysis in Section 4; conduct the further analysis and a series of robustness checks in Section 5; and detail our conclusions in Section 6.

² From the *Statistical Bulletin of China's Outward Foreign Direct Investment 2019*, jointly issued by the Ministry of Commerce, the National Bureau of Statistics, and the State Administration of Foreign Exchange.

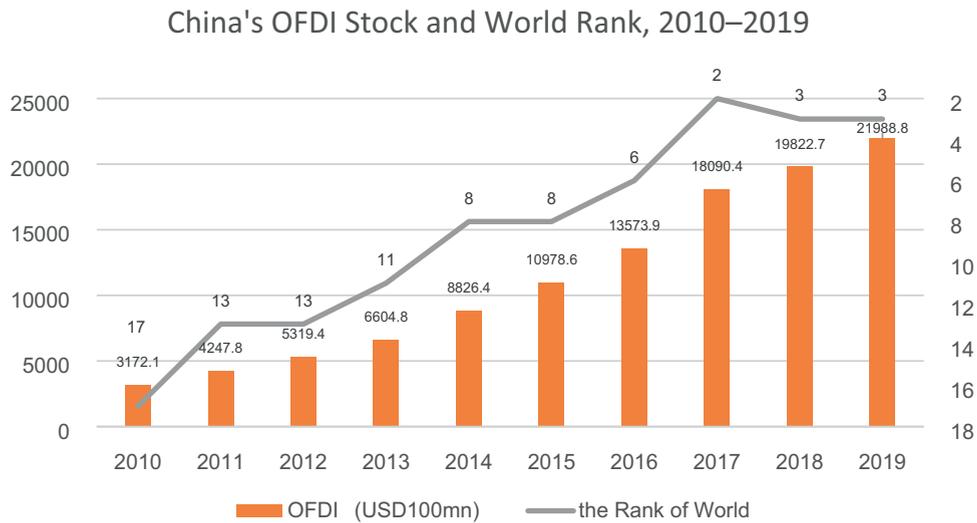


Fig. 1. China's OFDI stock and world ranking, 2010–2019. (Source: Ministry of Commerce of the People's Republic of China.)

2. Literature review and theoretical foundation

Following the economic crisis of 2008, almost all nations, including China, adopted large-scale economic stimulus plans. Soon after, China's overcapacity problem became increasingly severe. Given the negative influences of overcapacity on corporate resource allocation and the national economy (Zhao et al., 2015), reducing overcapacity ranked as a top mission of the Chinese government to boost the nation's economy after 2014.³ Based on previous research in developed countries, OFDI, a high-level enterprise internationalization strategy to achieve the international allocation of economic resources and production factors, offers a means to resolve the overcapacity problem. Consequently, some research posits that the BRI has been a "one-way road" (Huang, 2016; Irshad et al., 2015; Yu, 2017; Kohl, 2019), meaning that it benefits China as a channel for Chinese enterprises to cope with overcapacity more than other members. Accordingly, this study investigates whether Chinese firms have leveraged the BRI to shift excess capacity via investing in relevant countries and determines the impact mechanism of the BRI on BRI-participating enterprises' CU.

2.1. The belt and road initiative, capacity utilization, and investment

The BRI is an enormous project covering more than 60 emerging market economies, over half of the world's population, and a sizable proportion of global output (Swaine, 2015). It was initiated to establish free trade agreements and more balanced, sustainable regional growth. As proposed by China, one of the main motivations of the BRI is facilitating trade and investment, thereby advancing the development of BRI countries, as well as strategically shoring up members' energy, resource, and food security by taking a regional leadership role with China's most important neighbors (OECD, 2018). Using panel data for 57 countries along the BRI route, Dong and Zhang (2018) find that the BRI not only promotes the development of China's regional economy but also promotes node countries' infrastructure construction. Applying the gravity model, Yu et al. (2020) demonstrate that the trading volumes between China and BRI members have increased considerably owing to the reduced transport costs resulting from the infrastructure investment. Recent studies have estimated that OFDI flows from China to other BRI node countries have increased by 20%–50% (Kang et al., 2018; Yu et al., 2019; Shao, 2020). Closer connections between China and neighboring countries are conducive to achieving production capacity cooperation among BRI countries to ease the overcapacity problem (Li et al., 2017). Based on resource endowment, differences exist between industries, with comparative advantages among BRI node countries. Some node countries along the BRI routes remain at the early stage of industrial economic development, where the costs of labor, land, and other production factors are relatively low. Subsequently, there is an urgent demand for machinery, equipment, and infrastructure construction that can effectively complement China's industries with excess capacity (Li et al., 2017). In this case, under the "downgradient" investment mode of the BRI, transferring mature industries to undeveloped countries can promote upgrading in the local industries of host countries (Jia and Lei, 2019), as well as optimizing the allocation of resources and industrial structure to help the home country relieve production overcapacity (Kong et al., 2019). Zhang et al. (2017) also show that OFDI is helpful for enterprises to use foreign markets to resolve overcapacity, particularly businesses with service-oriented, sales-oriented, and technology-seeking investments. Therefore, the BRI, accompanied by the outward transfer of advantageous production capacity and technical cooperation among node countries, is considered a new channel for shifting China's excess production capacity.

Notably, existing theories regarding developed countries resolving excess capacity through OFDI are based on the developed

³ As documented by the Central Economic Work Conference (Zhongyang–Jingji–Gongzuo–Huiyi) held in December 2015.

international OFDI background, which may be unable to adapt to the specific circumstances of developing countries like China. Zhang et al. (2017) compare the effects of exporting and OFDI on resolving the overcapacity problem, analyzing panel data of Chinese enterprises and determining that the role of OFDI is insignificant. Wen (2017) verified this with a similar finding, comparing the overcapacity indexes of enterprises implementing OFDI and those not implementing OFDI using the PSM-DID approach. Moreover, Bai and Liu (2018) constructed an econometric model based on provincial panel data to investigate the potential resource misallocation improvement of OFDI, demonstrating that improvements in resource mismatching do not mean a reduction in overcapacity. In reality, the prosperity of the investments generated by the BRI can have side effects on enterprises' CU. With the ambitious objective of supporting the construction of infrastructure and transportation to link China and other BRI members, the Chinese government provides abundant support by establishing preferential policies and BRI-oriented financial institutions to encourage entities to join the program. With the support of the BRI-oriented trade policies, the level of domestic demand can be raised to a certain extent, which helps reduce the uncertainty of participating companies' future earnings. With appropriate policies to explore foreign markets, investment opportunities can be improved in the future (Aghion et al., 2005). In this way, the BRI is conducive to improving enterprises' expected investment opportunities, offering a prominent boost to investment motivations. Based on official FDI data published by the Ministry of Commerce of China, Kang et al. (2018) note that OFDI to BRI regions has already increased by 40%. In addition, several financial institutions, such as the Asian Infrastructure Investment Bank (AIIB), the Chinese Development Bank, and the Export-Import Bank of China, were formed specifically to finance BRI-related investments (Yu, 2017). Thanks to the transnational nature and preferential financial funding of the BRI, participating companies can ease financing constraints through orderly economic integration, improving their investment capacity (Campello et al., 2010; Chen et al., 2017a). Employing a firm-level DID model, Xu et al. (2019) confirm that BRI implementation significantly reduces the financing constraints of participating enterprises. Hillman (2018) determines that by the end of 2018, the accumulated investment driven by infrastructure is an estimated US \$1 trillion, which is expected to peak at US \$2 trillion by the end of 2030. Consequently, the BRI may stimulate enterprises to increase investment expenditure, resulting in investment "herd behavior" (Lin et al., 2010), which can result in enterprises blindly expanding production capacity (Wang et al., 2017) and ignoring market demand, resulting in overcapacity problems. Therefore, the impact of the BRI on firm production capacity via investment can be bilateral.

2.2. The belt and road initiative, capacity utilization, and innovation

Technological innovation activities are a major aspect of enterprises' long-term investment, which determines the level of enterprises' long-term competitiveness and even the maintenance of national competitive strategic advantages (Bone and Saxon, 2000; Tian and Wang, 2014). Technological progress is an important way to curb the formation of overcapacity and improve production CU, as asserted by Wu and Zhou (2019), especially in China, where the kernel of the overcapacity problem lies in the mismatch between industrial structure and market demand, due to a lack of innovation (Yu and Chen, 2019). According to existing studies, such as the work of Piperopoulos et al. (2018), Chen et al. (2012), Pradhan and Singh (2009), and Branstetter (2006), OFDI can notably improve enterprises' technological innovation capabilities. In this way, the BRI may positively affect enterprises' CU because of improved innovation capabilities, for four reasons. The first is the investment return feedback mechanism (Mansfield, 1982). As the BRI seeks to reduce trade barriers and investment environment uncertainty, participating firms can bypass unnecessary trade barriers to achieve a scale economy effect, reducing the unit cost of products and raising sales revenue. With the greater income gained from overseas investment, home companies can obtain more financial support for R&D to upgrade technological innovation capabilities. The second is the reverse technology spillover effect. The key resources obtained by overseas investment will generate a reverse technology spillover effect, helping enterprises of the home country optimize production efficiency and improve CU (Pottelsberghe and Lichtenberg, 2001; Branstetter, 2006; Chen et al., 2012; Jiang et al., 2013). Based on Chinese data, Li et al. (2016) confirm that OFDI significantly influences domestic innovation. The third is the overseas market competition mechanism, which compels multinational enterprises to continuously improve technological innovation capabilities (Lee, 2009; Yiu et al., 2007). BRI-participating enterprises not only face challenges from local enterprises but must also compete with native enterprises in the host country. To meet the diversified market demand of the host country, enterprises must increase R&D investment and constantly upgrade original technology to outcompete local enterprises through improved innovation capabilities. Last is the nontechnical channel. Enterprise innovation is inseparable from the support of financial funds and government policies (Lichtenberg, 1988). Due to enterprises' limited capital input, incentives for R&D investment are reduced under credit constraints (Aghion et al., 2012). To accomplish BRI objectives, several financial institutions, including the AIIB and the Silk Road Fund, were established by the Chinese government to provide BRI-oriented funding and ease financial constraints. Chen et al. (2017b) find that long-term borrowing by enterprises that have benefited from BRI policies has increased significantly. Xu et al. (2019) determine that BRI implementation indeed reduces the financial constraints of Chinese corporations through channels of relaxed financing sources and decreased operating costs. Therefore, based on the potential positive influence of the BRI on enterprise innovation capabilities, the CU of BRI-participating enterprises can be promoted through such increased capabilities.

However, Raffi and Yang (2017) assert that the motivation of most BRI-participating firms is primarily to export products and obtain market resources rather than pursue innovation in the early stage of the initiative. Chen et al. (2019) produce straightforward evidence demonstrating that the BRI has an inhibitory role in enterprise innovation input, implying that the degraded innovation capabilities caused by the BRI may weaken enterprises' production CU. Furthermore, one branch of literature hints at the negative influence of the BRI on innovation. First, infrastructure investment will inhibit enterprises' technological innovation and slow productivity and technological progress (Zhou, 2007). Cai and Ru (2016) verify this effect and more specifically demonstrate that infrastructure investment will crowd out enterprise R&D investment through the financial market, hindering productivity

improvement in the short run. Consequently, the BRI, with infrastructure projects as its top priority, can distort enterprises' innovation capabilities. Second, BRI countries are developing countries with varying levels of economic development, high investment risks, substantial environmental uncertainty, and considerable cultural distance (Fan et al., 2016; Huang, 2016; Ferdinand and Westward, 2016). While accessing broad opportunities, BRI-participating Chinese enterprises also face multiple challenges, such as information asymmetry, resource fragmentation, and unsound legal systems. According to Lu and Dang (2015), enterprises in countries with inadequate investor protection systems will hinder their own innovation input and output. Enterprises also may not gain a reverse technology spillover effect from less developed countries (Haddad and Harrison, 1993; Aitken and Harrison, 1999; Tian, 2007). In addition, environmental uncertainty can aggravate the deterioration of innovation capabilities (Caggese, 2012). Finally, empirical works, such as those of Schumpeter (1943) and Aghion et al. (2005), demonstrate a negative correlation between competition and innovation, as increased competition reduces the monopoly rents that reward successful innovators. BRI-participating enterprises must consider dual competition in both domestic and overseas markets, which limits their ability to assimilate and apply the knowledge acquired through OFDI activities (Chen and Tang, 2014; Chen and Tang, 2014). Therefore, empirical findings regarding the effects of the BRI on innovation are mixed, indicating an uncertain relationship between the BRI and participating enterprises' CU.

According to the literature reviewed, the impact of the BRI on production capacity through investment and innovation remains ambiguous. Based on previous research, this study explores the effect mechanism, assuming that the BRI hurts participating enterprises' production capacity in the short term under the current implementation environment.

3. Data and methodology

3.1. The sample

The sample used in this study is China's A-share listed companies from 2010 to 2018. The financial data used to calculate CU, TFP, and firm characteristics are extracted from the China Stock Market & Accounting Research Database. Data constituting CEO characteristics, such as CEO tenure, gender, and other relevant parameters, are drawn from the China Research Data Services Platform. The cutoff rules used to select the sample are the following: (1) observations with key financial variables missing and those belonging to the financial industry are removed; (2) firms coming under Special Treatment or Particular Transfer at any time in 2010–2018 are dropped for abnormal financial status; (3) firms with a total asset growth rate exceeding 100% are excluded from the dataset to remove the influence of mergers and acquisitions; and (4) the primary continuous variables are tailed at both ends of the 1% quantile to avoid the interference of extreme values on empirical estimation results. To precisely identify enterprises involved in the BRI initiative, we first match the sample of listed companies selected above with *THE LIST OF OVERSEAS OF INVESTMENT ENTERPRISES (INSTITUTIONS)* published by the Chinese Ministry of Commerce. Given that every listed firm has a different participation time point, which does not satisfy the implementation requirements of the traditional DID method, we adopt time-varying DID analysis to manage for different policy periods. To do so, we manually identify each firm's participation time point, identifying enterprises with investment destination countries that are BRI members after 2014 as the treatment group. Meanwhile, referencing Wang and Lu (2019), we only include those enterprises not involved in FDI activities as the control group to avoid disturbing the results by including firms invested in non-BRI countries.

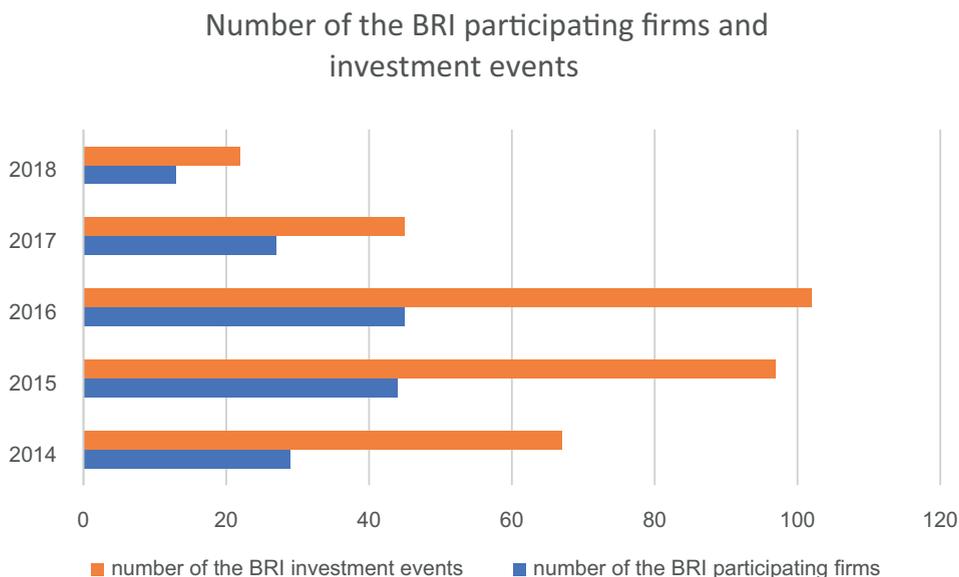


Fig. 2. Yearly distribution of BRI-participating firms and BRI investment events, 2014–2018. This bar chart shows the distribution of BRI-participating firms and BRI investment events, referring to the treated corporates in our 2014–2018 sample.

Finally, the sample obtained 8822 firm-years for 2017 A-share listed firms from 21 industries, of which 85 firms actively participated in the BRI by investing in countries along the routes. From 2014 to 2018, the listed companies of the treated group launched 333 overseas investment events, of which nearly half (47.4%) were targeted at BRI node countries. As shown in Fig. 2, the listed companies in our sample responded to the BRI most actively in 2016, the same year that the number of investment events and BRI-participating companies peaked. According to location, BRI-participating countries can be divided into eight regions: East Asia, the Association of Southeast Asian Nations (ASEAN), West Asia, South Asia, Central Asia, Central and Eastern Europe, Africa, and the Commonwealth of Independent States. Fig. 3 illustrates the investment activities of involved Chinese listed companies, which are primarily concentrated in ASEAN, West Asia, and South Asia and account for 29%, 25%, and 21% of the BRI investment events, respectively. More specifically, Singapore of ASEAN, Israel of West Asia, Pakistan of South Asia, Russia of the Commonwealth of Independent States, Kazakhstan of Central Asia, Czech Republic of Central and Eastern Europe, Mongolia of East Asia, and Egypt of Africa are the destination countries with the highest proportion of investment in their respective locations. BRI investments by treated corporations cover 13 industries, including manufacturing, construction, transportation, warehousing, and postal services. The manufacturing industry holds the top position, accounting for more than half of the investments, followed by the construction industry at 15.8%.

3.2. Capacity utilization rate

The construct of overcapacity was first proposed by Chamberlin (1947), explaining that it was caused by the organizational inefficiency of incomplete competition. Kamien and Schwartz (1972) defined overcapacity as a circumstance in which the average cost of monopoly competitive enterprises is the minimum, and optimal output is greater than actual output. CU is a direct indicator for measuring the excess capacity of enterprises. The CU estimation method can be divided into four rough categories, referencing previous literature. (1) The peak-to-peak method uses the peak value of macro output as production capacity (Shen, 1999); however, an important defect of this method is its assumption that capacity is fully utilized in the peak year, which obviously overestimates the level of CU, resulting in serious errors. (2) The investigation method introduces engineering production capacity, using the production capacity of machines and equipment to measure the production capacity. This approach is too rough to be used in the empirical examination because of its considerable limitations. (3) The function method includes production and cost functions. Based on multifactor inputs, this method uses the economic output level when the enterprise's production achieves cost minimization or profit maximization as production capacity (Morrison, 1985; Berndt and Fuss, 1989; Nelson, 1989; Segerson and Squires, 1992). However, this method cannot avoid measurement errors caused by price and cost factors. (4) Data envelopment analysis (DEA) and SFA have been widely used to overcome the measurement errors embedded in the function method. By measuring the efficiency of real output relative to potential output, these approaches provide a relatively convenient calculation method for measuring production capacity in the technical sense (Kirkley et al., 2002). Furthermore, compared with the DEA method, SFA fully considers the substitution elasticity of different production factors and randomly measures the production frontier of potential output, which is more aligned with reality. To estimate the frontier of the production function, representing the potential maximum output level of an industry, SFA takes the ratio of actual output to frontier output as the CU rate (Pascoe, 2007). In this study, we reference Battese and Coelli (1992), constructing a stochastic frontier model to capture CU at the firm production level.

Considering that the translog production function more accurately reflects the substitution and interaction effect between input factors, we select it as our production function. Moreover, we add the interaction term between time and input factors to reflect the various technological progress of different inputs, as shown in Eq. (1). Additionally, the firm-fixed effect is established as an exponential function of time in a time-varying decay model, as denoted by Eq. (3), which is conducive to releasing the strong assumption of technological neutrality to reveal more characteristics within economic systems. Using Eq. (4), the CU ratio of enterprise i in year t can be measured:

$$\ln Y_{it} = \beta_0 + \beta_1 t + \beta_2 \ln C_{it} + \beta_3 \ln L_{it} + \beta_4 (\ln C_{it})^2 + \beta_5 (\ln L_{it})^2 + \beta_6 \ln C_{it} \times \ln L_{it} + \beta_7 t \times \ln C_{it} + \beta_8 t \times \ln L_{it} + \varepsilon_{it} \quad (1)$$

$$\varepsilon_{it} = v_{it} - u_{it} \quad (2)$$

$$u_{it} = g(t) \cdot u_i = \exp[-\eta(t - T_i)] \cdot u_i \quad (3)$$

$$CU_{it} = \frac{E[f(x_{it}, \beta) \exp(v_{it} - u_{it})]}{E[f(x_{it}, \beta) \exp(v_{it} - u_{it}) | u_{it} = 0]} = \exp(-u_{it}) \quad (4)$$

where $f(x_{it}, \beta)$ is the production function, Y is the total value of output measured by the main business income. C , L , and t represent capital input, labor input, and time trends, respectively. Notably, ε is a compound residual, of which the real inefficiency term is u_{it} , with a time-varying feature. The core of the SFA method is to obtain the technical inefficiency term u_{it} by decomposing the error term. η , a parameter to be estimated, reflects whether technical efficiency changes over time. In our sample, the coefficient of η is estimated to be significantly negative, confirming the appropriateness of the model.⁴ In addition, the relatively short postpolicy period of the sample (2014–2018) is not the main concern for capturing capacity shifting. Two potential factors can mitigate this worry. First,

⁴ The strength of applying the SFA method (Battese and Coelli, 1992) and its accuracy descriptions are presented in Appendix Table A3.

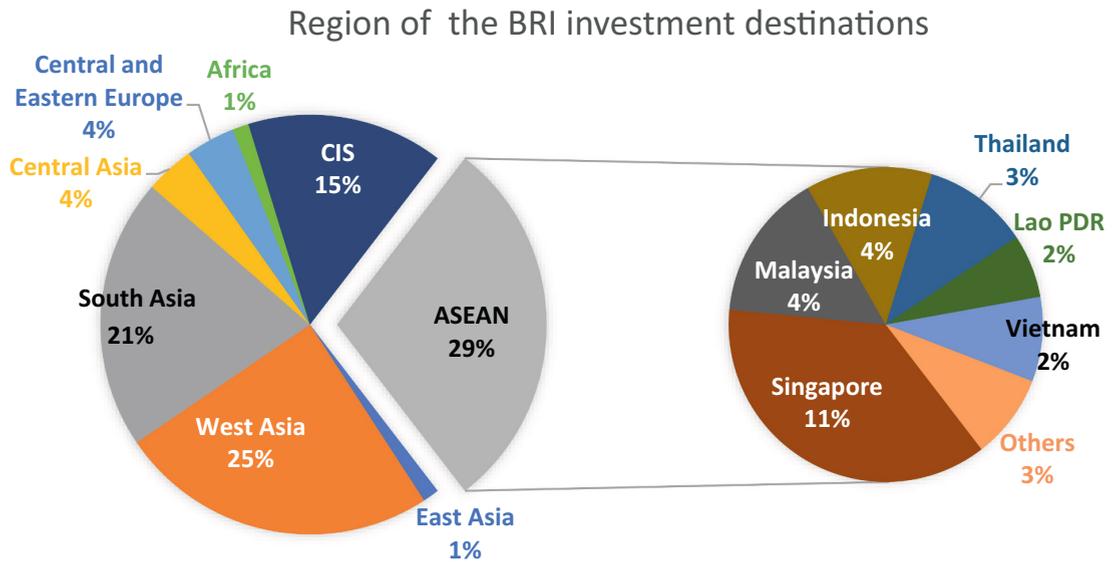


Fig. 3. Regional distribution of BRI investment destinations. This pie graph presents the proportion of eight of the Belt and Road regions invested by the participating corporates in the investment events.

referencing Fig. 2, we observe that the number of BRI investment events peaks in 2016, followed by a downward trend after 2016. In this case, the potential capacity-shifting activities incurred by the most frequent BRI investments are covered by our sample, making the results identifying CU changes more credible. Second, the CU captured by the SFA method is more about microlevel inefficiencies in production, which refers to deviations from the theoretical frontier caused by the ineffectiveness of enterprises' technology. The specific BC92 SFA model adopted to calculate the CU rate also relaxes the strong technological neutrality assumption, considering time-varying factors, which provides a relatively robust measurement of CU to investigate the changes prior to and after the BRI.

3.3. Corporate investment and innovation

The ambitious objective of the BRI, which is to develop and strengthen transportation, logistics, and other infrastructure between China and countries along BRI routes, generates massive opportunities for Chinese companies to make investments. As noted in Section 2, regardless of improved investment expectations or catering to policy orientation, Chinese enterprises have the intention to over-invest, leading to production expansion, which eventually affects CU. Hence, following Chen and Liu (2018), we introduce the mediating variable *Invest* to denote enterprises' investment levels in the mechanism examination. The variable is constructed by using the ratio of the difference between expenditures for the construction of fixed assets, intangible assets, and other long-term assets and the net cash received from the disposal of fixed assets, intangible assets, and other long-term assets to the total assets at the beginning of the period.

Overcapacity is also closely related to enterprises' innovation capabilities. In China, the overcapacity problem is primarily due to inadequate innovation capabilities and low product quality, resulting in misallocations between industrial structure and market demand (Yu and Chen, 2019). In previous literature, R&D expenditure, invention patents, and TFP are commonly used as proxy variables for enterprises' innovation capabilities (Wang et al., 2018; Hagedoorn and Cloodt, 2003; Freeman and Soete, 1997). Of the three indicators, the number of patents is the most widely used variable to represent the output performance of innovation achievements; however, there are four primary limitations to using patents as a proxy for innovation (Griliches, 1990), particularly in China (Qian et al., 2010). First, the requirements for patent applications are relatively high, and using a number of patents to proxy innovation capabilities cannot reflect some improvement innovations, which may underestimate enterprises' innovation performance. Second, some enterprises are unwilling to apply for patents on innovative outputs based on strategic considerations or to protect commercial secrets and prevent premature information leakage (He and Tian, 2013). Third, some problems are embedded within the patent data itself, such as the time effect of patent applications, truncation problems, differences in technology types, regional differences, and other inconsistencies that distort the understanding of patents and patent data, resulting in unstable conclusions (Lerner & Seru, 2017). Finally, differences in enterprises' enthusiasm for patent application also influence the accuracy of this index for measuring innovation performance, as patent protection awareness is relatively weak in China (Qian et al., 2010). Consequently, in this research, we choose R&D investment intensity (*RD*) (Cohen and Levinthal, 1990) and TFP (Pottelsberghe and Lichtenberg, 2001; Wang et al., 2018) to proxy for enterprises' innovation investments and achievements, respectively.

Referencing previous literature (Cohen and Levinthal, 1990; Chen et al., 2019), we use the ratio of R&D expenditure to total assets to measure enterprise R&D intensity. For TFP measurement, referencing Akerberg et al., (2015), we adopt the Akerberg-Caves-Frazer (ACF) method to calculate enterprises' TFP in the mechanism analysis:

$$\ln Y_{it} = \beta_0 + \beta_k \ln K_{it} + \beta_l \ln L_{it} + \beta_m \ln M_{it} + \beta_r \ln RD_{it} + \beta_a \text{age}_{it} + \beta_s \text{state}_{it} + \beta_e \text{exit}_{it} + \sum_t \delta_t \text{year}_t + \varepsilon_{it} \tag{5}$$

where K_{it} , L_{it} , M_{it} , RD_{it} , and ε_{it} represent capital stock, number of employees, intermediate investment (enterprises' expenditures to purchase goods and accept services), R&D investment, and TFP, respectively.⁵

3.4. Other variables

In addition to the main variables presented above, we include several variables for empirical specification. Following previous literature, we obtain Tobin's Q (Q) to capture firm investment opportunities to control for firm characteristics. In the light research published by Bergemann and Hege (2005), firms with financial constraints will suppress production capabilities; therefore, the tangible assets ratio (Tang), the fixed assets ratio (FA), the degree of capital concentration (Capct), the cash holdings ratio (Cash), net profitability (Profit), growth potential (Growth), and long-term debt repayment capacity (Solvency) are included to specify the heterogeneity of corporate financing constraint levels.

In the further analysis section, we include variables PC, PCrank, and PCnum to indicate the political connection between enterprises and government. Following related research on political connection (Fan et al., 2007; Sun et al., 2015; Yu and Zheng, 2019), a firm is defined as politically connected if the manager or CEO has taken a position on the Chinese People's Political Consultative Conference (CPPCC) national committee. The most basic measure is a dummy variable, PC, which equals 1 if either the CEO or a manager has served as a member of the CPPCC and 0 otherwise. We also measure the strength of political connection in terms of position rank (PCrank) and the number (PCnum) of connected individuals in an enterprise. We classify the variable PCrank based on the highest rank of executives or managers into three levels, including municipal level (rank = 1), provincial level (rank = 2), and national level (rank = 3), and enterprises without political connections are coded as 0. PCnum is calculated by the total number of executives or managers that hold a position in the CPPCC. For both PCrank and PCnum, the higher the value, the stronger the connection with the government.

To investigate overseas resource changes, we include variables OverseasNBR and OverseasRisk, indicating the probability of OFDI in non-BRI node countries and OFDI risk, respectively, to capture the resource changes of the enterprises correlated with the BRI. OverseasNBR is a dummy variable used to identify whether the enterprise makes an overseas investment in countries excluding the node countries. OverseasRisk is calculated by the fluctuation of the overseas return on an enterprise's total assets to proxy as enterprises' overseas investment risk.

Finally, as the principle-agent problem may influence firms' decision-making, reducing the real investment from its optimal level (Malmendier and Tate, 2005; Galasso and Simcoe, 2011; Faccio et al., 2016), we introduce CEO characteristic variables, including gender (Male), age (CEOage), compensation (Payment), and working tenure (Tenure) in the robustness analysis.

3.5. Research methods

We first examine the effect of China's BRI on firms' CU. As each company participates in the BRI at different times, we adopt a time-varying DID model, Eq. (6), to investigate whether the BRI influences firms' CU more accurately. Furthermore, to ensure that treated and control groups are comparable, we employ the PSM approach developed by Rosenbaum and Rubin (1985) to select the treatment and control firms and reduce the endogeneity concern of the self-selection issue, as represented by Eq. (7):

$$CU_{it} = \alpha + \mu_i + \theta D_{it} + \beta X_{it} + \lambda_t + \varepsilon_{it} \tag{6}$$

$$CU_{it}^{PSM} = \alpha + \mu_i + \theta D_{it} + \beta X_{it} + \lambda_t + \varepsilon_{it} \tag{7}$$

where D_{it} , the dummy variable, is equivalent to $Treat_i * POST_{it}$. Referencing Wang and Lu (2019), we define a firm as part of the treated group if it participated in overseas investment with destination countries along the BRI region,⁶ based on THE LIST OF OVERSEAS OF INVESTMENT ENTERPRISES (INSTITUTIONS) published by the Chinese Ministry of Commerce. As each firm has a distinct time schedule for investing in a BRI region, we apply the time-varying DID identification method. If firm i is involved in OFDI events in year t ($t \geq 2014$), and the destination of its foreign investment is a BRI member, then the value of D_{it} in subsequent years is equals 1 and 0 otherwise. X_{it} represents control variables. λ_t and μ_i stand for time trends and individual fixed effects, which do not vary over time, respectively. After eliminating other interference factors, the coefficient θ is the average treatment effect that we are most interested in, capturing the influences of the BRI on the treated group.

We next test the potential mechanism behind CU changes by following a mediating effect model (Baron and Kenny, 1986):

$$M_{it} = \alpha + \mu_i + \omega D_{it} + \beta X_{it} + \lambda_t + \varepsilon_{it} \tag{8}$$

$$CU_{it} = \alpha + \mu_i + \phi_1 D_{it} + \phi_2 M_{it} + \beta X_{it} + \lambda_t + \varepsilon_{it} \tag{9}$$

⁵ When using the Levinsohn-Petrin (LP) method to calculate TFP for the robustness test, we set $\ln L_{it}$ and $\ln RD_{it}$ as free variables, $\ln M_{it}$ as proxy variable, and $\ln K_{it}$ as the capital variable.

⁶ See Appendix Table A1 for the specific list of BRI participating countries.

where M is the mediating variable. On the premise of coefficient θ being significant, if coefficient ω of model (8) and coefficient ϕ_2 of model (9) are both significant, then the mediating effect of M on CU is significant. In other words, it confirms that the BRI affects treated firms' CU through the mediator M .

4. Empirical results

4.1. Descriptive statistics

Table 1 presents the descriptive statistics of our sample. All continuous variables are winsorized at 1% to exclude extreme values. The range in CU variation is relatively wide, from 0.01 to 0.18, and the mean value is only 0.05, implying that the CU rate of Chinese enterprises is generally low. The average TFP value calculated using the ACF method (TFP_{ACF}) is 15.02, the standard deviation is 0.86, the minimum value is 13.24, the median is 14.96, and the maximum value is 17.43, indicating a notable difference in enterprises' TFP during the sample period.⁷ Meanwhile, firms' tangible assets ($Tang$) account for 37% of total assets, FA account for 23%, and cash holdings ($Cash$) account for 18%. The mean of solvency capacity ($Solvency$) is 2.34, indicating that firms' long-term debt accounts for less than half of shareholders' equity, on average. Net profitability, measured by $profit$, has an average of 7% for the sample, and 95% of top executives (CEO and managers) are male, with approximately 6.4 years' tenure, and an average age of 52 years.

4.2. The belt and road initiative and corporate capacity utilization rate

4.2.1. Time-varying difference-in-differences estimation

China's BRI was officially implemented in 2014 to establish a unified large market to make full use of both international and domestic markets, through cultural exchange and integration. Notably, most of the BRI members are low-income economies with development potential, which will create new markets and facilitate trade, in addition to opening up investment opportunities for Chinese enterprises to achieve sustainable returns and rapid growth. The initiative also represents the commitment to a more open economy, allowing enterprises to enjoy more favorable access to capital for acquisitions in technology to pursue indigenous innovation and resource allocation efficiency improvement. Therefore, BRI implementation presents a quasi-natural experimental field for investigating firm CU changes.

The results are presented in Table 2, wherein model (1) provides a preliminary finding of a significant difference in the CU rate between BRI participant and nonparticipant firms. The coefficient of D is significantly negative, indicating that the BRI has a negative effect on participating firms' CU rate, which directly counters the suspicion that the BRI is a strategy for Chinese firms to transfer excess production capacity. After adding firm-level control variables, with standard error clustering at firm and province level individually, models (2) and (3) once again verify that instead of increasing the treated group's CU, it has diminished during the post initiative period at a 1% significant level with t -values of -2.72 and -2.85 , respectively. Furthermore, considering enterprises' ownership structure, we also determine that there is an obvious difference in the coefficient of interaction between SOEs and private enterprises, comparing the last two columns of Table 2. The results illustrate that the suppression effect of the BRI on CU is mainly dominated by SOEs, as the coefficient is only significant in for the SOE subsample. SOEs' CU rate decreases 10.7% compared with control peers. This result is consistent with the pivotal role of SOEs responding to the government's BRI policy, as the most reliable force for achieving government goals.

4.2.2. Time-varying propensity score matching-difference-in-differences estimation

To ensure that the treated and control groups are comparable, we employ the PSM approach developed by Rosenbaum and Rubin (1985) to select treated and control firms and reduce the endogeneity concern on the self-selection issue. Our matching procedure uses a one-to-one nearest neighbor matching of propensity scores, which are estimated via a probit regression of the binary treatment variable on a set of firm characteristics. The balanced test results are presented in Table A4 of the Appendix, presenting, pairwise comparisons of the covariates before and after the matching process. After matching there are predominantly no significant differences between the treated and control groups, suggesting that the two groups are comparable.

Prior to running the time-varying PSM-DID regression, we first present the estimated change in CU following the implementation of China's BRI policy in Fig. 4, revealing that before the policy, the estimated coefficient fluctuates around 0 (95% confidence interval contains a 0 value), while the coefficient is significantly negative in the years following policy implementation. This demonstrates that there is no obvious difference between the treated and control groups before BRI implementation, meeting the assumption of the parallel trend of the DID approach. After the policy time point, the negative effect of the BRI on corporate CU continues to rise during the sample period. Thereafter, we perform the time-varying DID analysis based on the PSM sample using Eq. (7).

The results of the PSM regressions are presented in Table 3. Consistent with the findings in Table 2, the results in columns (1)–(3) of Table 3 verify that the coefficients of D are all negative and statistically significant. The PSM-DID estimated results suggest that the BRI had a significantly negative impact on firms' CU rates. Furthermore, mirroring the results of Table 2, the suppressive effect of the BRI on CU is only remarkable for SOEs (at a 1% significance level), whereas non-SOEs elicit no significant effect from a statistical perspective. This means that SOEs, as the backbones of the BRI, suffered the greatest loss of CU compared with their non-SOE peers.

⁷ The TFP calculated using the LP method (TFP_{LP}) elicits similar results as the ACF method.

Table 1

Summary statistics. This table reports the descriptive statistics for 8822 firm-year observations covering all Chinese publicly listed firms between 2010 and 2018 in our sample. All continuous variables are winsorized at 1% level at both tails of distribution. Variable definitions can be found in the Appendix A2.

Variable	Obv.	Mean	Std. Dev.	Min	Median	Max
<i>CU</i>	8822	0.05	0.03	0.01	0.04	0.18
<i>TFP_ACF</i>	8822	15.02	0.86	13.24	14.96	17.43
<i>RD</i>	8822	1.97	1.98	0.00	1.60	26.23
<i>Invest</i>	8822	0.07	0.07	-0.06	0.05	0.33
<i>Q</i>	8822	2.15	1.31	0.91	1.72	8.14
<i>Profit</i>	8822	0.07	0.12	-0.55	0.06	0.43
<i>Solvency</i>	8822	2.34	3.00	0.15	1.31	18.65
<i>Tang</i>	8822	0.38	0.17	0.04	0.37	0.77
<i>Cash</i>	8822	0.18	0.12	0.02	0.15	0.62
<i>Capctl</i>	8822	2.17	1.46	0.40	1.78	8.85
<i>FA</i>	8822	0.23	0.15	0.01	0.20	0.67
<i>Growth</i>	8822	0.13	0.27	-0.47	0.10	1.18
<i>CEOage</i>	8798	51.73	7.09	28.00	51.00	80.00
<i>PC</i>	8822	0.14	0.34	0	0	1
<i>PCRank</i>	8822	0.23	0.65	0	0	3
<i>PCnum</i>	8822	0.14	0.45	0	0	4
<i>OvseasNBR</i>	8822	0.44	0.50	0	0	1
<i>OvseasRisk</i>	3888	0.03	0.06	0.00	0.02	0.24
<i>Tenure</i>	8810	6.41	3.90	0.00	6.00	24.00
<i>Payment</i>	7376	13.12	0.86	2.48	13.13	16.80
<i>Male</i>	8813	0.95	0.21	0.00	1.00	1.00

Table 2

Time-varying DID results based on the BRI. This table presents the regression results of Eq. (6). The dependent variable is *CU*, calculated by the Battese and Coelli (1992) SFA method. *D* is the dummy variable, equivalent to $Treat_i * POST_{it}$. Models (1)–(3) are results based on the full sample. The difference between models (2) and (3) is that they are regressed on different clustering levels—model (2) clusters at the firm level, while model (3) is at the province level. Models (4) and (5) are the results of regressions based on SOEs and non-SOEs individually. All continuous variables are winsorized at 1% and defined in Appendix A. Our standard errors are robust and clustered at the firm level.

	Full sample			Subsample	
	(1)	(2)	(3)	(4)	(5)
<i>D</i>	-0.070*** (-2.78)	-0.067*** (-2.72)	-0.067*** (-2.85)	-0.107*** (-2.94)	-0.010 (-0.37)
<i>Q</i>		0.008*** (2.79)	0.008*** (2.80)	0.010* (1.79)	0.004 (1.56)
<i>Profit</i>		-0.128*** (-5.42)	-0.128*** (-4.80)	-0.214*** (-3.81)	-0.095*** (-4.22)
<i>Solvency</i>		-0.003 (-1.48)	-0.003 (-1.28)	0.013 (1.62)	-0.005*** (-4.73)
<i>Tang</i>		0.134** (2.54)	0.134** (2.58)	0.236** (2.19)	0.093* (1.74)
<i>Cash</i>		-0.091*** (-2.97)	-0.091*** (-3.11)	0.005 (0.07)	-0.092*** (-3.09)
<i>Capctl</i>		0.029*** (6.92)	0.029*** (7.22)	0.027*** (3.33)	0.028*** (5.98)
<i>FA</i>		-0.203*** (-3.03)	-0.203*** (-2.86)	-0.366*** (-2.66)	-0.123* (-1.81)
<i>Growth</i>		0.039*** (5.08)	0.039*** (3.97)	0.055*** (3.89)	0.029*** (3.44)
<i>_cons</i>	5.520*** (698.32)	5.467*** (225.09)	5.467*** (219.80)	5.991*** (134.10)	5.139*** (205.58)
Year FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
N	8822	8822	8822	3290	5532
R-squared	0.902	0.907	0.907	0.900	0.916

*, **, *** indicate that the coefficients are significant at 10%, 5%, and 1%, respectively.

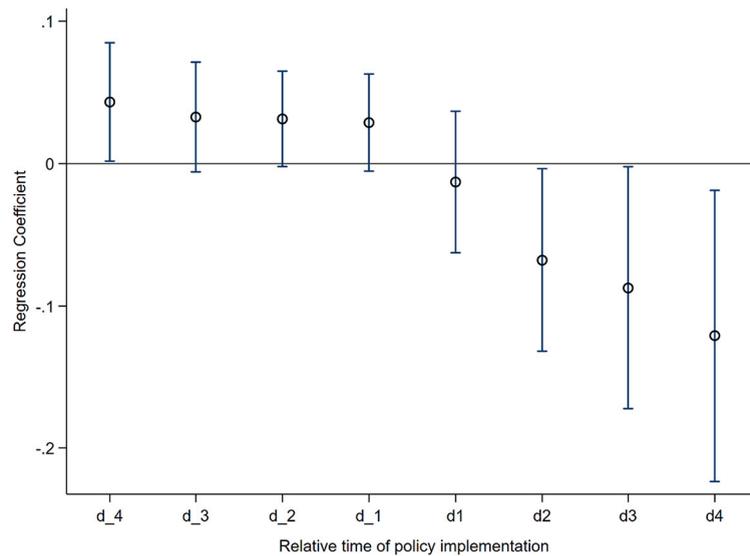


Fig. 4. Parallel trends in capacity utilization rate. This figure illustrates the estimated change in CU due to the implementation of China's BRI in 2010 and 2018.

Table 3

PSM + time-varying DID result based on the BRI. This table presents the regression results of Eq. (7), covering 8788 firm-year Chinese publicly listed firms during 2010 to 2018. The dependent variables are firm capacity utilization rate (*CU*). Major independent variable is BRI participant firm indicator (*D*). Except that model (3) is cluster at province level, other models are all cluster at the firm level. All continuous variables are winsorized at 1% and defined in the Appendix A2. We report t-statistics in parentheses. Our standard errors are robust.

	Full sample			Subsample	
	(1)	(2)	(3)	(4)	(5)
<i>D</i>	-0.067*** (-2.70)	-0.064*** (-2.62)	-0.064** (-2.74)	-0.103*** (-2.82)	-0.009 (-0.34)
<i>Q</i>		0.006*** (2.89)	0.006** (2.75)	0.007* (1.76)	0.003 (1.33)
<i>Profit</i>		-0.119*** (-5.84)	-0.119*** (-5.77)	-0.175*** (-4.55)	-0.098*** (-4.20)
<i>Solvency</i>		-0.005*** (-3.83)	-0.005*** (-3.31)	0.006 (1.43)	-0.006*** (-5.09)
<i>Tang</i>		0.120** (2.36)	0.120** (2.39)	0.213** (2.03)	0.091* (1.69)
<i>Cash</i>		-0.092*** (-3.10)	-0.092*** (-3.32)	-0.009 (-0.12)	-0.085*** (-2.83)
<i>Capctl</i>		0.029*** (6.87)	0.029*** (6.63)	0.027*** (3.49)	0.028*** (5.90)
<i>FA</i>		-0.189*** (-2.87)	-0.189** (-2.72)	-0.337** (-2.48)	-0.120* (-1.77)
<i>Growth</i>		0.038*** (5.03)	0.038*** (4.00)	0.051*** (3.71)	0.029*** (3.50)
<i>_cons</i>	5.529*** (707.39)	5.488*** (264.04)	5.488*** (260.07)	6.024*** (157.05)	5.148*** (204.88)
Year FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
N	8788	8788	8788	3279	5509
R-squared	0.904	0.909	0.909	0.903	0.916

*, **, *** indicate that the coefficients are significant at 10%, 5%, and 1%, respectively.

Based on the above evidence, we demonstrate that the BRI has not served as a channel for Chinese enterprises to shift surplus production capacity; on the contrary, the overcapacity problem worsened following BRI implementation.

4.3. Mechanism

Thus far, we have demonstrated that firms participating in the BRI suffered from CU loss compared with controlled peers. The next

question is about examining how this happens. As the second-largest economy in the world, the BRI reflects China's responsibility for globalization and future international development and desire to provide good opportunities and environments for Chinese firms to make overseas investments. But how do BRI participant Chinese firms experience a slide in CU? In this section, we examine the possible underlying economic channels through which the BRI affects corporate CU using the mediating effect model proposed by Baron and Kenny (1986). According to our sample, the results in Table 4 indicate that excessive investment and insufficient innovation are the main channels leading to BRI-participating enterprises' overcapacity. Panel A lists the regressions based on the full sample, and panel B presents the results based on PSM subsamples.

4.3.1. Investment mechanism

Enterprise behavior is a significant factor affecting overcapacity, and investment decisions are one of the factors that matter. The BRI may stimulate enterprises to increase investment expenditure, resulting in investment "herd behavior" (Lin et al., 2010), blindly expanding production capacity (Wang et al., 2017), ignoring market demand, and eventually leading to an excess capacity problem.

The first two columns of Table 4 reveal that treated enterprises conduct a surge of investment after participating in the BRI, which is indicated by a positive coefficient of D in column (1), with a significance level of 5%. We then include the variable *Invest* into the model, as shown in Eq. (9), presenting the result in column (2), revealing a significant negative relationship between corporate investment and CU, and the coefficient of D remains negative. This indicates that the treated enterprises' excessive investment is a key reason for overcapacity. This finding is consistent with Chen and Liu (2018), who demonstrate that the investment level of listed companies in BRI-affected provinces increased by 10.11% after the BRI was implemented. As similar evidence from the PSM regressions is reported in panel B, the investment channel of overcapacity is confirmed.

4.3.2. Innovation mechanism

In addition, deteriorations in the CU of enterprises are closely related to their innovation capabilities (Wu and Zhou, 2019; Yu and Chen, 2019). The results in columns (3)–(6) of Table 4 demonstrate that diminished innovation capabilities are another reason for enterprise overcapacity. Considering enterprises' limited resources, the expanded investment expenditures of BRI-participating firms will crowd out investment in innovation. Subsequently, we see a significant negative coefficient of D (at a 99% confidence level) in column (3), which is consistent with Chen et al. (2019). Although the decline in innovation input for BRI-participating enterprises is not the cause of overcapacity (the coefficient of RD is not significant in column (4)), the results in the last two columns of Table 4 confirm that the drop in innovation capabilities represented by TFP is a potential factor explaining enterprises' declining CU.⁸ From column (5), the coefficient of TFP is significantly negative at a 1% significance level with a t -value of -2.06 . After including TFP in the regression, as in Eq. (9), the coefficient of D remains significantly negative, while TFP is positively linked to CU, confirming that decreased innovation capabilities indicated by TFP are indeed a mediating channel of the impact of the BRI on CU. This result aligns with the work of Yu and Chen (2019). They assert that the essence of Chinese overcapacity lies in the mismatch between industrial structure and market demand, primarily due to a lack of innovation and low product quality. Combined with the same conclusion drawn from panel B, we verify innovation as a channel of overcapacity.

5. Further analysis

The above results demonstrate that the BRI does not provide an opportunity for Chinese enterprises to transfer excess capacity. A natural follow-up question is what drives enterprises to participate in the BRI? What benefits have Chinese firms gained that motivate them to invest in BRI node countries? Buckley et al. (2007) identify four motivations for OFDI activity: market-seeking, resource-seeking, strategic-seeking, and technology-seeking. As for China, previous studies indicate that resource-seeking dominates the other motivations (Cheung and Qian, 2008; Kolstad and Wiig, 2012; Chang, 2014); however, Chinese OFDI motivation varies across OFDI destinations. Chinese enterprises usually invest in developed countries for strategic resources and technology (Chen and Tang, 2014). Meanwhile, if they choose developing countries as investment destinations, it is for market-seeking and resource-seeking reasons (Morck et al., 2008). This section explores the benefits enterprises gain from investing in BRI node countries.

5.1. Domestic political resource-seeking

Political connection is widely documented as an intangible asset that benefits enterprises' economic activities (Chen et al., 2017c; Houston et al., 2014). For instance, politically connected firms are associated with lower financial costs (Francis et al., 2009; Boubakri et al., 2012), enjoy better access to external capital (Khwaja and Mian, 2005; Li et al., 2008), and are more likely to receive government support (Blau et al., 2013), particularly when they are in an unfavorable situation (Faccio et al., 2006; Yu and Zheng, 2019). In a relationship-based society, connection with the government is more valuable for Chinese enterprises (Allen et al., 2005). Compared with SOEs, private enterprises have a natural disadvantage in political ties with the government; therefore, they must actively adjust operating and investment decisions to better meet the political objectives of the government in order to establish closer political connections. As the BRI is a national program, participating in the BRI provides all enterprises, particularly non-SOEs, with an appropriate opportunity to cater to the government, which could strengthen political ties. Therefore, we examine whether Chinese

⁸ The results remain robust when we change the TFP calculation method to LP.

Table 4

Mechanism analysis. This table reports the results of mediating effect tests. We test possible channels of the impact of BRI on CU using mediating effect model ((Baron and Kenny, 1986). Due to space limitations, other control variables are not listed in the table, which is uniformly expressed by controls. The t-statistics in parentheses are calculated from the robust standard error clustering at the firm level.

Panel A: Full sample						
	(1)	(2)	(3)	(4)	(5)	(6)
	Invest	CU	RD	CU	TFP_ACF	CU
<i>D</i>	0.014** (1.99)	-0.065*** (-2.63)	-0.179** (-2.28)	-0.067*** (-2.72)	-0.095** (-2.06)	-0.055** (-1.98)
<i>Invest</i>		-0.178*** (-4.54)				
<i>RD</i>				-0.001 (-0.37)		
<i>TFP_ACF</i>						0.035*** (2.76)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.147*** (15.68)	5.493*** (208.32)	1.750*** (11.80)	5.469*** (210.30)	14.992*** (255.47)	4.888*** (27.07)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	8822	8822	8822	8822	8822	7365
R ²	0.180	0.907	0.093	0.907	0.457	0.910
Panel B: Propensity score matching subsample						
	(1)	(2)	(3)	(4)	(5)	(6)
	Invest	CU	RD	CU	TFP_ACF	CU
<i>D</i>	0.014** (1.99)	-0.062** (-2.52)	-0.174** (-2.23)	-0.065*** (-2.63)	-0.096** (-2.07)	-0.052* (-1.90)
<i>Invest</i>		-0.187*** (-4.98)				
<i>RD</i>				-0.002 (-0.77)		
<i>TFP_ACF</i>						0.039*** (3.35)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.148*** (15.92)	5.515*** (250.77)	1.783*** (12.34)	5.491*** (254.76)	14.988*** (263.66)	4.868*** (27.19)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	8788	8788	8786	8786	8788	7335
R ²	0.181	0.909	0.092	0.908	0.460	0.912

The symbols ***, **, and* denote significance levels at 1%, 5%, and 10%, respectively.

enterprises gain more political resources through the BRI, presenting the results in Table 5, which divides regressions into SOE and non-SOE groups.

All the results uncover the same result, indicating that the BRI provides an excellent opportunity for non-SOEs to strengthen political connections, while this is not evident for SOEs. Estimates from column (1) indicate that the probability of private enterprises obtaining political connections after participating in the BRI increased significantly. As previously described, we employ two alternative measures, *PCrank* and *PCnum*, to gage the strength of political connections, correspondingly presenting the estimates in columns (3) and (5). In each column, BRI-participating private enterprises enjoy stronger political ties for position rank and the total number of

Table 5

Further analysis of the benefits in the domestic market of BRI-participating Chinese firms. The results of political connection changes are shown in columns (1)–(6), where the dependent variables are individually *PC*, *PCrank*, and *PCnum*. *PC* is a dummy variable that equals 1 if a firm is classified as politically connected and 0 otherwise at the end of year *t*. *PCrank* is an ordinal variable indicating the highest rank of connected people in the firm at the end of year *t*. *PCnum* is the number of connected people in the firm at the end of year *t*. Each regression is divided into separate SOE and non-SOE subsamples. We report the t-statistics in parentheses. Our standard errors are robust and clustered at the firm level.

	PC		PCrank		PCnum	
	Non-SOE (1)	SOE (2)	Non-SOE (3)	SOE (4)	Non-SOE (5)	SOE (6)
<i>D</i>	2.096** (2.35)	-1.584 (-1.30)	2.096** (2.35)	-1.584 (-1.30)	2.096** (2.35)	-1.584 (-1.30)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
N	1088	462	1088	462	1088	462

*, **, *** indicate that the coefficients are significant at 10%, 5%, and 1%, respectively.

connected people (significant at the 5% level). In contrast, there is no significant change in political connection for SOEs, as shown in columns (2), (4), and (6). This finding indicates that for Chinese private enterprises, actively following the call of the BRI to cater to the government's political goals is an efficient way to please local or national bureaucrats and develop closer political connections (Du and Wang, 2013; Kung and Ma, 2018). In contrast, Chinese SOEs are not motivated to pursue stronger political ties by participating in the BRI, as the government already has direct ownership control over these enterprises.

5.2. Overseas market resource-seeking

Under a policy background encouraging Chinese enterprises to “go global,” the BRI provides enterprises with the best stage, offering an opportunity to expand into overseas markets. For corporations in emerging markets, launching a transnational investment, such as an acquisition, is one of the best ways to obtain necessary strategic assets and open the international market to global competition (Deng, 2007; Gubbi et al., 2010). Therefore, we examine the impact of the BRI on corporate overseas investment activities excluding BRI node countries and the risk accompanied by investment. The results are presented in Table 6, revealing that the estimated coefficients on D in the first three columns are all positive and significant, indicating that the BRI has successfully improved the probability of participating enterprises investing in foreign markets, excluding BRI node countries. This effect is primarily dominated by the non-SOE subsample, for which the coefficient of D is 0.932 and significant at the 1% level. In contrast, in the SOE subsample, the coefficient is significant at a much smaller magnitude. We further investigate the characteristics of the OFDI destinations excluding the node countries and surprisingly discover that more than 96% of the BRI-participating firms explore new markets in developed countries, among which Asia ranks first, followed by Europe. Moreover, the estimates in columns (3)–(6) indicate that the BRI contributes to reductions in non-SOE investment risk in overseas markets, while the effect is insignificant for SOEs.

Collectively, these results suggest that the BRI has indeed served as a channel for Chinese enterprises to expand into new foreign markets, and this influence is more prominent for private enterprises.

5.3. Robustness tests

5.3.1. Additional fixed effects

In our main regression, based on Eq. (7), we include firm-fixed effects to remove time-invariant firm characteristics and include year-fixed effects to control time trends. Nevertheless, the negative relationship between the BRI and corporate CU may be spurious if the model omits any time-varying characteristics at industry and province levels. Therefore, to alleviate these concerns, we include industry-by-year and province-by-year fixed effects in the model. The results are presented in Panels A and B of Table 7. The coefficients of D are negative and statistically significant in all the model specifications.

5.3.2. CEO characteristics

CEO characteristics are another factor to be considered that may affect enterprises' CU. Some research has investigated firms' investment and production decisions that can affect CU (Han et al., 2011; Wu and Zhou, 2019); however, CEOs have a pivotal influence on firms' strategic decisions (Hambrick and Mason, 1984; Malmendier et al., 2011). Following previous research, we include CEO gender (*Male*), age (*CEOage*), compensation (*Payment*), and working tenure (*Tenure*) as measures of CEO characteristics. As shown in panel C of Table 7, the coefficients of D remain significantly negative.

5.3.3. Placebo test

Considering that omitted variables at the firm-year level may bias the estimation result, we conduct a placebo test and repeat our analysis. Referencing Cai and Ru (2016) and La Ferrara et al. (2012), we first randomly select 68 listed firms as the “pseudo” treated

Table 6

Further analysis about the benefits in overseas market of the BRI participant Chinese firms. The results of investment probability in non-nodal countries and changes in investment risk in overseas markets are correspondingly shown in columns (1)–(3) and (4)–(6). The dependent variable of columns (1)–(3) is *OvseasNBR*, a dummy variable used to identify whether firms invest in non-BRI node countries. The dependent variable of columns (3)–(6) is *OvseasRisk*, which captures overseas investment risk. Columns (2)–(3) and (5)–(6) show results based on the SOE and non-SOE subsamples, respectively. We report the t-statistics in parentheses.

	OvseasNBR			OvseasRisk		
	(1)	(2)	(3)	(4)	(5)	(6)
	Full sample	Non-SOE	SOE	Full sample	Non-SOE	SOE
D	0.717*** (3.60)	0.932*** (3.72)	0.537* (1.94)	-0.013** (-2.19)	-0.017** (-2.00)	-0.011 (-1.43)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-1.269*** (-5.13)	-1.038*** (-3.12)	-1.449*** (-3.94)	0.036*** (5.16)	0.042*** (4.88)	0.028** (2.37)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	No	No	Yes	Yes	Yes
Industry	Yes	Yes	Yes	No	No	No
N	8822	5532	3290	3888	2621	1267

*, **, *** indicate that the coefficients are significant at 10%, 5%, and 1%, respectively.

Table 7

Additional controls. This table reports the robust tests for robustness. We control industry-by-year and province-by-year fixed effects in Panels A and B, respectively. In Panels C and E, we include additional CSR index and corporate governance variables to alleviate bias in the DID results. Variables are defined in Appendix Table A2. The t-statistics in parentheses are calculated from the robust standard errors clustered at the province level.

VARIABLES	(1)	(2)
Dep. Var. <i>CU</i>	Full sample	PSM subsample
Panel A. Controlling industry-by-year fixed effects		
<i>D</i>	-0.067*** (-2.72)	-0.064*** (-2.62)
Firm controls	Yes	Yes
Year FE	Yes	Yes
Firm FE	Yes	Yes
Industry*Year FE	Yes	Yes
<i>N</i>	8822	8788
<i>R</i> ²	0.907	0.909
Panel B. Controlling province-by-year fixed effects		
<i>D</i>	-0.067*** (-2.72)	-0.064*** (-2.62)
Firm controls	Yes	Yes
Year FE	Yes	Yes
Firm FE	Yes	Yes
Province*Year FE	Yes	Yes
<i>N</i>	8822	8788
<i>R</i> ²	0.907	0.909
Panel C. Controlling CEO characteristics		
<i>D</i>	-0.058** (-2.04)	-0.056** (-1.96)
Firm controls	Yes	Yes
CEO controls	Yes	Yes
Year FE	Yes	Yes
Firm FE	Yes	Yes
<i>N</i>	7365	7335
<i>R</i> ²	0.909	0.911

The symbols ***, **, and * denote significance levels of 1%, 5%, and 10%, respectively.

group, then randomly select a certain year from 2010 to 2018 for each treated firm as its policy time. To avoid the interference of other events with small probability, we repeat the above process 500 times for regression analysis, presenting the DID results on *CU* in Fig. 5. The findings demonstrate that the estimation results are not seriously biased due to missing variables and our results are robust.

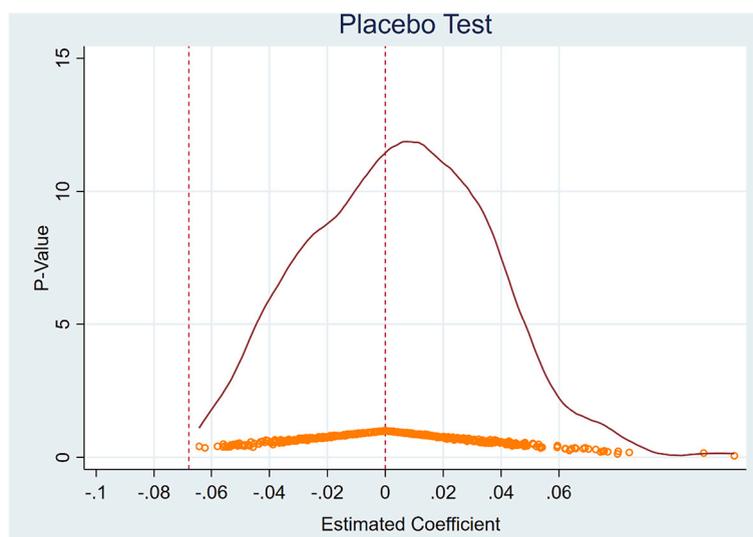


Fig. 5. Placebo test. This figure pictures the kernel density of the estimated coefficients and the distribution of the corresponding *p*-values for 500 randomly generated treated groups.

6. Conclusion

This study investigates how China's BRI, covering more than one-third of global GDP, affected Chinese listed firms' CU from 2010 to 2018. Specifically, we document a negative effect of the BRI on corporations' CU rate, determining that SOEs have a particularly active part in responding to this initiative. Mechanism analysis shows that overinvestment and decreased innovation are the primary mechanisms behind this effect. Moreover, further analysis reveals a distinction in benefits gained from the BRI between participating enterprises with different ownership structures, providing insight into the motivations driving the enterprises to respond to the call of the BRI. Regarding the resource-seeking motivation, we determine that the BRI is conducive to non-SOEs gaining closer political connections in the domestic market and obtaining new investment opportunities in overseas markets, implying that the potential motivation of private enterprises to participate in the BRI is one of resource-seeking in both domestic and overseas markets. In contrast, no significant improvement in political and foreign investment opportunities is evident for SOEs. Considering that they are directly owned by the government, it is easy for political bureaus to exercise control over SOEs and assign investment tasks to them. The evidence presented in the further analysis suggests that the potential motivation behind SOEs' participation in the BRI may be to fulfill political tasks to help the upper-level government achieve goals (Fan et al., 2011).

Finally, some unaddressed issues remain in this study. The dataset used in this research analysis only goes to 2018, limited by the availability of *THE LIST OF OVERSEAS OF INVESTMENT ENTERPRISES (INSTITUTIONS)* published by the Chinese Ministry of Commerce used to identify whether corporations participated in the BRI. As noted previously, although the peak year for participating enterprises' investment in BRI node countries (2016) is covered by our sample, the period remains relatively short. Hence, a longer-term and more detailed dataset would be better for enhancing the credibility of the findings in this study. Furthermore, as the state-sponsored BRI is a paramount national strategy, which could influence many considerations, such as policy, infrastructure, trade, financial, and people-to-people connectivity, it is hoped that future research will investigate more to identify the motivation of participating enterprises from different angles.

CRedit authorship contribution statement

Guowei Cai: Conceptualization, Methodology, Supervision. **Xuejiao Zhang:** Conceptualization, Formal analysis, Writing – original draft. **Hao Yang:** Conceptualization, Writing – review & editing.

Data availability

The authors do not have permission to share data.

Appendix A. Appendix

Referring to Wang and Lu (2019), we collate and summarize the participating countries in the Belt and Road Initiative, in combination with the official information website of China's Belt and Road Initiative (www.yidaiyilu.gov.cn). The detailed information is scheduled in Table A1.

Table A1

Summary of countries along the "Belt and Road" region.

Region	Country
East Asia	Mongolia
ASEAN	Singapore, Malaysia, Indonesia, Myanmar, Thailand, Lao PDR, Cambodia, Vietnam, Brunei, Philippines
West Asia	Iran, Iraq, Turkey, Syrian Arab Republic, Jordan, Lebanon, Israel, Palestine, Saudi Arabia, Yemen, Oman, United Arab Emirates, Qatar, Kuwait, Bahrain, Greece, Cyprus
South Asia	India, Pakistan, Bangladesh, Afghanistan, Sri Lanka, Maldives, Nepal, Bhutan
Central Asia	Kazakhstan, Uzbekistan, Turkmenistan, Tajikistan, Kyrgyzstan
Central and Eastern Europe	Poland, Lithuania, Estonia, Latvia, Czech Republic, Slovak Republic, Hungary, Slovenia, Croatia, Bosnia and Herzegovina, Montenegro, Serbia, Romania, Bulgaria, Macedonia
Africa	Egypt
CIS	Russia, Ukraine, Belarus, Georgia, Azerbaijan, Armenia, Moldova

Table A2

Variable definitions.

Variables	Definition
CU	Capacity utility is measured by a time-varying decay SFA model (Battese and Coelli, 1992) through the translog function presented in Eq. (2) as production function.
TFP _{ACF}	Total factor productivity measured by Akerberg–Caves–Frazer (2015) method
Invest	

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Table A2 (continued)

Variables	Definition
	(Cash paid for purchasing and constructing fixed assets, intangible assets, and other long-term assets + net cash paid for the acquisition of subsidiaries and other business units – net cash received from the disposal of subsidiaries and other business units) / total assets at the beginning of the period
<i>D</i>	The dummy variable is equivalent to $Treat_i * POST_{it}$. If firm <i>i</i> is involved in OFDI events in year <i>t</i> ($t \geq 2014$) and the destination of its foreign investment is one of the BRI members, then the value of D_{it} in subsequent years all equal 1, and 0 otherwise.
<i>PC</i>	A dummy variable coded as 1 if the CEO or any manager has served as a member of CPPCC, and 0 otherwise.
<i>PCnum</i>	the total number of executives or managers that hold a position in CPPCC
<i>PCrank</i>	An ordinal variable classified into three levels according to the administrative rank of connected managers or directors: PCrank = 1 if the connected managers or directors hold the position of CPPCC member at the municipal level; PCrank = 2 if the connected managers or directors hold the position of provincial CPPCC member; PC rank = 3 if the connected managers or directors hold the position of national CPPCC member; PC_rank = 0 if observations don't have political connections.
<i>OvseasNBR</i>	Dummy variable that equals 1 if the firm makes an overseas investment in countries other than the BRI members; otherwise, it is 0.
<i>OvseasRisk</i>	The fluctuation of the overseas return on the enterprise's total assets
<i>Q</i>	Tobin's Q is the ratio of market value and the book value of total assets
<i>Profit</i>	Net profit divided by main business income
<i>Cash</i>	Cash is expressed by year-end cash divided by total assets
<i>Tang</i>	Tangible asset ratio
<i>Solvency</i>	Total shareholders' equity divided by total liabilities
<i>Growth</i>	(Operating income at the end of the year – proportion of operating income of the previous year) / operating income at the end of the previous year
<i>Capctl</i>	Ratio of total assets to operating income
<i>FA</i>	Ratio of fixed assets to total assets
<i>SOE</i>	SOE measures government ownership and equals 1 if the firm is a state-owned enterprise and 0 otherwise.
<i>Male</i>	Indicator variable if the gender of the CEO is male
<i>CEOage</i>	Age of CEO
<i>Tenure</i>	The difference between CEO tenure date and the departure date
<i>Payment</i>	The compensation of CEO in year <i>t</i>

A.1. The accuracy of capacity utilization rate estimation

A stochastic frontier analysis model with an exponential specification of time-varying structure is applied as presented in Eqs. (2)–(5), with the regression results listed in column (2) of Table A3. As shown, the coefficient of η is -0.012 and significant at a 1% level, revealing average growth in technical inefficiency. This means that the excess capacity utilization of Chinese firms became increasingly severe during the sample years. Our previous discussions are based on the presumption that the time-varying decay stochastic frontier model, i.e., model (1), is properly specified. The results of the traditional likelihood ratio test under the restrictions $u = 0$ and $\eta = 0$ are displayed in the last two rows of Table 5. Obviously, model (1) is superior to all other models with restrictions, having the largest likelihood ratio of -3727.77 and a mean value of 0.0476 .

Table A3

Capacity utilization estimation of various models. Model (1) is the result with no restrictions. Model (2) assumes $\eta = 0$ corresponding to the time-invariant model considered by Battese et al., (1988). Model (3) is the special case of model (1) where u has half-normal distribution i.e., is assumed to be zero. Model (4) is the standard loglikelihood model. The t-statistics in parentheses are calculated from the robust standard errors. The symbols ***, **, and * denote significance level at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Variables	Unrestricted	$\eta = 0$	$u = 0$	$\eta = u = 0$
lnC	1.023*** (5.23)	1.005*** (5.09)	0.486** (2.39)	0.480** (2.35)
lnL	0.929*** (7.65)	0.900*** (7.36)	1.151*** (8.87)	1.114*** (8.56)
(lnC) ²	0.005 (1.11)	0.005 (1.10)	0.019*** (3.74)	0.019*** (3.65)
(lnL) ²	0.038*** (9.93)	0.037*** (9.58)	0.030*** (7.60)	0.029*** (7.36)
lnC × lnL	-0.056*** (-8.31)	-0.053*** (-7.94)	-0.062*** (-8.72)	-0.060*** (-8.38)
lnC × t	-0.000** (-1.98)	-0.000** (-2.09)	-0.000 (-0.05)	-0.000 (-0.07)
lnL × t	-0.000 (-1.29)	-0.000 (-1.13)	-0.000*** (-2.81)	-0.000*** (-2.59)
Constant	-0.437 (-0.21)	0.373 (0.02)	2.735 (1.30)	3.037 (1.43)
<i>u</i>	3.332*** (9.98)	3.501 (0.15)		

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Table A3 (continued)

	(1)	(2)	(3)	(4)
η	-0.012*** (-6.75)		-0.009*** (-4.12)	
LL value	-3727.77	-3751.54	-5061.47	-5069.96
P-value	0.000	0.000	0.000	0.000

A.2. Propensity score matching

In our research, the key question is how China's Belt and Road Initiative has affected firm production capacity utilization and, more importantly, how this program has affected changes in BRI-participating firms' capacity utilization rates. We measure treated firms by identifying their overseas investment destinations and whether they belong to BRI regions. To reduce the endogeneity concern of the self-selection issue, we use PSM to do 1:1 nearest neighbor matching first. The matching is based on Eq. (10):

$$\begin{aligned} treat = & \gamma_0 + \gamma_1 Q + \gamma_2 Profit + \gamma_3 Solvency + \gamma_4 Tang + \gamma_5 Cash \\ & + \gamma_6 Capctl + \gamma_7 FA + \gamma_8 Growth + \varepsilon \end{aligned} \quad (10)$$

where *treat* measures whether the firm participates in the BRI and equals 1 if the firm invests in the BRI members and 0 if the firm is not involved in foreign direct investment activities. In the prediction model, we include various firm-level control variables, which are the same as in the main regressions, to help explain the OFDI behavior of a firm. *Q* is Tobin's *Q* of a firm used to capture its investment opportunities. Some financial variables are also included in the regression, such as tangible assets ratio (*Tang*), fixed assets ratio (*FA*), the degree of capital concentration (*Capctl*), cash holdings ratio (*Cash*), net profitability (*Profit*), growth potential (*Growth*), long-term debt repayment ability (*Solvency*) to specify heterogeneity of corporate financing constraint levels.

The matching procedure is to run logit regression based on Eq. (10) and then use the propensity score (i.e., the predicted probability) from the prematch regression and perform nearest neighbor 1:1 matching to match the treated firms and their control peers. Table A4 reports the balanced test result before and after matching. Except for variable *Tang*, there are no significant differences among other control variables after PSM matching, and the standardized deviation of each variable's bias is greatly reduced, which is less than 10%. It demonstrates that the data of the treated and the control group are balanced, and the individual characteristic differences between the two groups get better controlled (Rosenbaum and Rubin, 1985).

Table A4

Balanced tests before and after PSM. This table reports the balanced test result. Our matching procedure relies on 1:1 nearest neighbor matching, which are estimated by a probit regression of the binary treatment variable on a set of firm characteristics. The unmatched sample includes 7 treated observations and 25 control observations, while the matched sample contains 323 treated observations and 7010 matched control observations.

Variable	Sample	Treated	Control	% bias	bias	t-statistic	p > t
<i>Q</i>	Unmatched	1.819	2.165	-27.9		-5.35	0.000
	Matched	1.819	1.791	2.3	91.8	0.37	0.708
<i>Profit</i>	Unmatched	0.7278	0.651	6.4		1.27	0.204
	Matched	0.7278	0.712	1.3	79.2	0.22	0.824
<i>Solvency</i>	Unmatched	1.471	2.390	-34.2		-6.23	0.000
	Matched	1.471	1.647	-6.6	80.8	-1.09	0.275
<i>Tang</i>	Unmatched	0.368	0.378	-6.1		-1.20	0.23
	Matched	0.368	0.347	-13.2	-117.2	2.03	0.043
<i>Cash</i>	Unmatched	0.171	0.183	-10.3		-1.93	0.053
	Matched	0.171	0.178	-5.8	43.0	-0.91	0.365
<i>Capctl</i>	Unmatched	1.987	2.176	-13.3		-2.62	0.009
	Matched	1.987	1.908	5.6	58.0	0.89	0.373
<i>FA</i>	Unmatched	0.225	0.229	-3.0		-0.63	0.526
	Matched	0.225	0.217	4.9	-64.3	0.73	0.464
<i>Growth</i>	Unmatched	0.133	0.129	1.4		0.29	0.773
	Matched	0.133	0.132	0.6	60.2	0.09	0.931

Author statement

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